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THE

NATURAL HISTORY

OF

LINCOLNSHIRE ;

BEING

THE NATURAL HISTORY SECTION

OF

LINCOLNSHIRE NOTES & QUERIES,

From January, 1896, to October, 1897.

EDITED BY

THE REV. E. ADRIAN WOODRUFFE-PEACOCK,

L.Th., F.L.S., F.G.S.,

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Vicar of Cadney, Brigg.

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PREFACE.

DURING the autumn of 1895 arrangements were entered into between the Publisher of *Lincolnshire Notes & Queries* and the Rev. E. Adrian Woodruffe-Peacock, L.Th., F.L.S., F.G.S., Hon. Organising Secretary of the Lincolnshire Naturalists Union, to publish a Natural History Section of 16 pages each quarter as an annexe to the Antiquarian portion of *Lincolnshire Notes & Queries*, commencing with the January part of Vol. V. of that periodical. The two portions (Antiquarian and Natural History) were kept quite distinct from each other, each having a separate pagination. This arrangement was kept in force during the period January, 1896 to October, 1897, when it was relinquished on account of the Publisher not receiving sufficient support to enable him to continue to publish without charge this section relating to Natural History, in which so few took the interest that was desired. Accordingly a small volume of 128 pages of extremely interesting matter has alone been produced, but there has been supplied a Title Page, Index, and List of Contents, in order to give the volume the position of standing on its own merits.

The Editor has certainly been fortunate in procuring many able writers on matters Geological, Botanical, Zoological, Entomological, &c., connected with the County of Lincoln which are of considerable value. The very complete Place Name List will serve as a guide to the student of this subject, and deserves a careful perusal.

Mr. Burton's "Story of the Lincoln Gap," illustrated, is a remarkable account of the laws relating to river courses; and Mr. George Sills' article on the "Archæological History of the Wash," shewing the effect the formation of the Wash had on

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the low-lying land between Lincoln and Nottingham, &c., and even upon Lincoln itself, is one of first-class interest to any Lincolnshire student of Geology.

The Publisher regrets, as much as the Editor, that his efforts to found a Magazine dealing with the Natural History of Lincolnshire has not met with the success that was expected, but should an interest in this desirable field of work at any time ever arise, he will be the first to offer a helping hand as publisher, and do his best to produce a well-executed publication worthy alike of the subject and of the county to which he belongs.

Horncastle, 1898.

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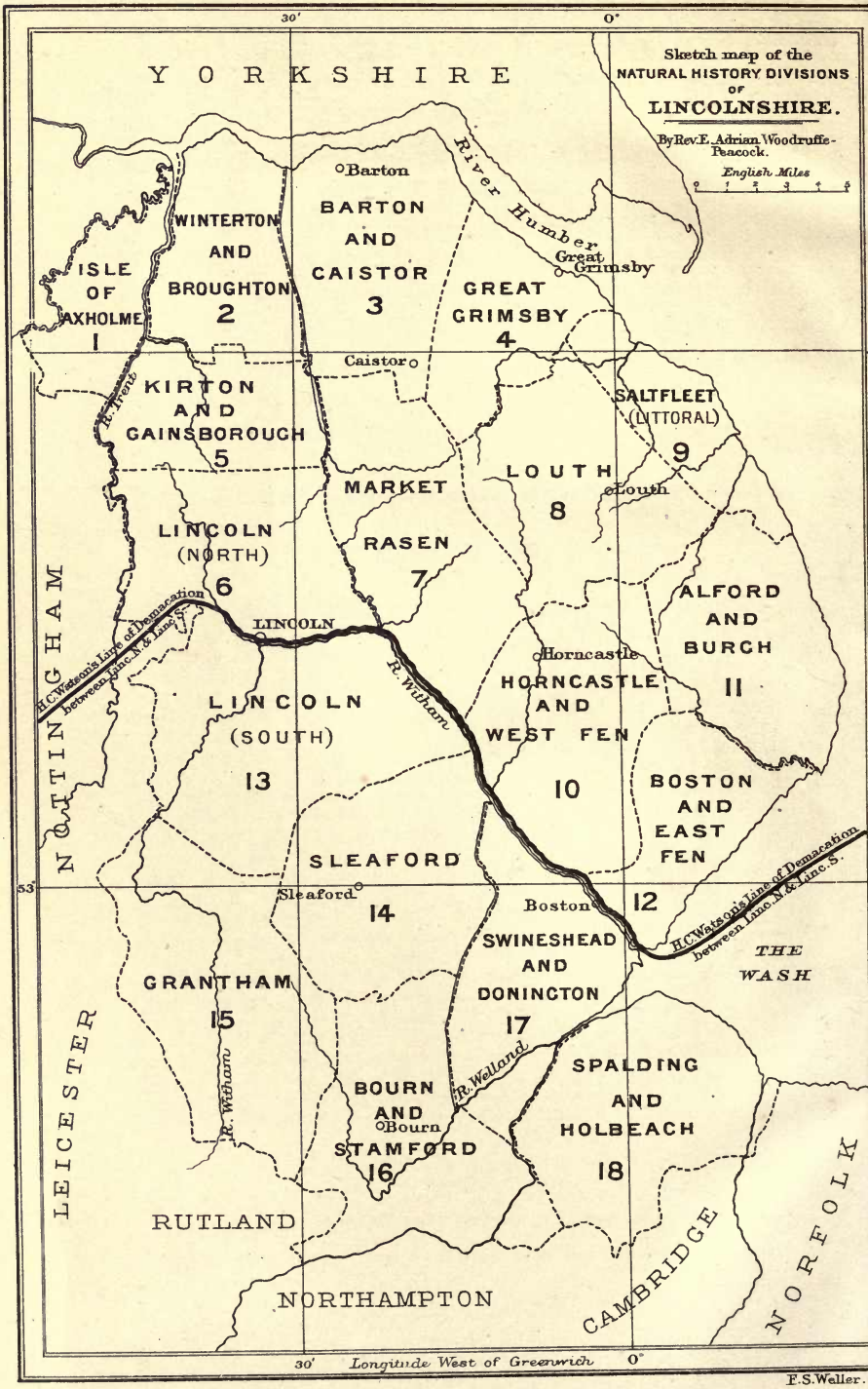
Sketch map of the
NATURAL HISTORY DIVISIONS
OF
LINCOLNSHIRE.
By Rev. E. Adrian Woodruffe-Peacock.
English Miles
0 1 2 3 4 5
30'
0°
YORKSHIRE
River Humber
Barton
Great Grimsby
ISLE OF AXHOLME 1
WINTERTON AND BROUGHTON 2
BARTON AND CAISTOR 3
GREAT GRIMSBY 4
Caistor
R. Trent
KIRTON AND GAINSBOROUGH 5
SALTFLEET (LITTORAL) 9
MARKET RASEN 7
LOUTH 8
Louth
LINCOLN (NORTH) 6
ALFORD AND BURCH 11
LINCOLN
Horncastle
HORNCASTLE AND WEST FEN 10
H.C. Watson's Line of Demarcation between Linc. N. & Linc. S.
R. Witham
LINCOLN (SOUTH) 13
BOSTON AND EAST FEN 12
SLEAFORD 14
Sleaford
Boston
SWINESHEAD AND DONINGTON 17
THE WASH
GRANTHAM 15
R. Witham
R. Welland
SPALDING AND HOLBEACH 18
BOURN AND STAMFORD 16
Bourn
RUTLAND
NORTHAMPTON
CAMBRIDGE
NORFOLK
LEICESTER
NOTTINGHAM
53°
Longitude West of Greenwich
F.S. Weller. lith.

Lincolnshire Notes & Queries.

The Natural History Section.

PREFATORY NOTE.

SIXTEEN pages per quarter have been dedicated by the proprietor of this journal to advancing the study of Natural History in Lincolnshire. With this end in view, we propose to print a series of literary articles on every branch of the subject which can interest dwellers in the county. With these we hope to appeal, at once, by their accuracy to the workers who are already athirst for knowledge, and by their clear and simple style to those—not a few—who require to be incited to take a greater interest in the varied materials for observation that a quiet walk or drive in the country will reveal. As but little space can be found for Notes and Queries in such a limited number of pages, the Editor has arranged with the Sectional Secretaries of the Lincolnshire Naturalists' Union to render any help in their power to any one applying for it, *e.g.*, by naming specimens, giving advice as to the best books to be consulted, or the best grounds for collecting. The following list gives the names and addresses of the Sectional Secretaries to whom direct application should be made by post; but in case of doubt, it will be better to apply to the editor of this section of the journal, who will transmit the communication to the proper authority, from whom a reply will be received in due course. The Sectional Secretaries are:—Geology, H. Cooke, F.L.S., F.G.S., 123, Monks' Road, Lincoln; Phanerogamic Botany, Rev. E. Adrian Woodruffe-Peacock, L.Th., F.L.S., F.G.S., Cadney, Brigg; Cryptogamic Botany, J. Larder, 33, Mercer Row, Louth; Vertebrate Zoology, John Cordeaux, M.B.O.U., Great Cotes House, R.S.O., Lincolnshire; Conchology, W. D. Roebuck, F.L.S., F.R.P.S.E., Sunny Bank, Leeds; General Entomology, Rev. Canon W. W. Fowler, M.A., F.L.S., F.E.S., Lincoln; Lepidoptera, Rev. G. H. Raynor, M.A., Panton, Wragby; Coleoptera, Rev. A. Thornley, F.L.S., F.E.S., South Leverton, Lincoln.

Any further information required can be obtained by applying to

Cadney Vicarage, Brigg. THE EDITOR.

*THE NATURAL HISTORY DIVISIONS OF LINCOLNSHIRE.**

Rev. E. ADRIAN WOODRUFFE-PEACOCK, L.Th., F.L.S., F.G.S.,
Vicar of Cadney, Brigg, General and Botanical Secretary Lincolnshire Naturalists' Union, and Curator of Lincolnshire County Herbarium.

THE COUNTY.

LINCOLNSHIRE, the second county in England in size, according to the last Ordnance Survey, contains 1,783,769·998 square acres or 2,787·140 square miles of land, fresh water, salt-marsh, fore-shore and tidal water. It is about 75 miles from its extreme points north and south, and 45 miles in its widest part from east to west, and lies between the parallels 52 degrees and 40 minutes and 53 degrees 43 minutes north latitude, and 56 minutes west and 22 minutes east longitude from the meridian of Greenwich. A little more than half of the county is upland and heath of the wold and cliff ranges of hills; the rest was formerly fen, marsh, and carr, but is now most thoroughly drained by natural means, artificial dykes, and steam pumps. There is not an acre of true fen left in the whole county. Even the bogs on the sand commons are most restricted, and only found in two or three parishes in north-west Lindsey. The drainage has been so thoroughly carried out that in a dry season the fen-farms more distant from the outfall of the rivers are badly in want of water for their stock, and to keep the cattle from wandering across the natural boundaries of the district, the fen-dykes, which are often quite dry. The native fauna and flora of the fens have quite gone, but we have the fen-dyke fauna and flora in profusion, if anyone but a native can understand the distinction, or appreciate the effect which the annual cleaning out and mowing the sides of our larger and smaller drains, liming and manuring have had on our flora—annual, biennial, or perennial—and the life which it sustains.

NATURAL HISTORY DIVISIONS.

The plan I have adopted for these Divisions, after many useless attempts to make a geological or river-basin distribution,

* This is the greater part of an article, with alterations and additions, which appeared in *The Naturalist*, 1895, pp. 289–301, republished by special permission.

much thought, and some consultation with others interested in the matter, is a purely arbitrary one, like that of the late Professor Babington's *Flora of Cambridgeshire*, for the peculiar physical features of Lincolnshire, with its 500,000 acres of fenland and low hills, admit of no other. With a very few exceptions all the natural history records yet published are on the parish basis; taking the larger towns as far as possible as centres the parishes have been aggregated round them into divisions, always keeping in view two points, (1) the work already done, and (2) railway communication for future observation. The Watsonian Vice-Counties, N. Lincs. 54 or N. and S. Lincs. 53 or S., have been left intact, clearly separated as they are by the river Witham from Boston to Lincoln, and by the Foss Dyke from Lincoln to the border of Nottingham. The modern course of these streams is the line of demarcation; and as both cut through one or more parishes on their way from the cathedral city to their outfalls in the Wash and river Trent, these parishes have both a N. and S. Vice-county number. This is also the case with parishes scattered in departments referred to below. In making notes in divided or scattered parishes it is an easy matter to remember whether the Witham or Foss Dyke is to the north or south of the place of observation. As N. contains more than three-fifths of the county, and as S. is almost one-half unwooded fen-land, which has been so greatly changed in fauna and flora by drainage and high farming during the last hundred years, I have given N. a double share of Divisions, which are therefore smaller for the most part than those of S. They are shown by black lines, names, and numbers on the map, and are named as follows:

NORTH LINCOLNSHIRE, 54.

1.—Isle of Axholme.
2.—Winterton and Broughton.
3.—Barton and Caistor.
4.—Great Grimsby.
5.—Kirton and Gainsborough.
6.—Lincoln (North).
7.—Market Rasen.
8.—Louth.
9.—Saltfleet (Littoral).
10.—Horncastle and West Fen.
11.—Alford and Burgh.
12.—Boston and East Fen.

SOUTH LINCOLNSHIRE, 53.

13.—Lincoln (South).
14.—Sleaford.
15.—Grantham.
16.—Bourn and Stamford.
17.—Swineshead and Donington.
18.—Spalding and Holbeach.

The numbers indicate which vice-county a record refers to without the constant use of N. and S.

MAPS.

The best Map for field work is the index map to the six-

inch Ordnance Survey. It has the parishes printed in colours, and all the roads are shown. Messrs. Stanford, Cockspur Street, Charing Cross, London, S.W. supply it. Sub-divisions have been added to the larger divisions for the purpose of facilitating more detailed work, and of more fully indicating the distribution of rare and local species. These were obligingly worked out by W. Denison Roebuck, F.L.S., of Sunny Bank, Leeds—the editor of *The Naturalist*—who is prepared to supply workers with a large scale map of Lincolnshire showing the parish boundaries, and coloured clearly to to indicate all the division and sub-division. In the *Sketch Map of the Soils of Lincolnshire*, by A. J. Jukes Browne, B.A., F.G.S., which appeared in *The Naturalist* with the first edition of this paper, the divisions and sub-divisions are shown, and are further indicated by the initial letters of the cardinal points of the compass. It is not thought advisable to print these initial letters after the division numbers in the place name list that follows, as it would add considerably to the length of this paper. All these maps can be obtained from the Editor of the Natural History section of the *Lincolnshire Notes & Queries*.

THE PLACE NAME LIST.

The following alphabetical list gives the name and division number of every parish, township, hamlet, railway stations which are not called after places, and remarkable physical features of the county, such as fens, hills, commons, woods and waters, —when these places have a name of their own—to be found in gazetteers, directories, and maps, new and old, which have come under my observation. In the rare case where a parish is scattered in separate departments lying at a distance from one another, or a wood, with a distinctive name, runs continuously from one parish into the next on the boundary line of a division, two—only in one case three—numbers are required to indicate the exact spot where an observation might be made or a specimen taken. The spelling of these place-names is that adopted by the Post Office Directory, or if not found there, which was most frequently met with in the books and maps consulted. Workers in the field, who intend to use this place-name list, in recording the distribution of the species they are studying, should note that Railway Stations are not always situated in the parish after which they are named, in the case

of Dogdyke not even in the same Vice-county as the parish. The sand and silt-banks of the Wash, and round the coast, as well as the warp banks of the Humber and Trent, are so constantly changing that they are hardly worth recording, but with the latest maps to hand I have done my best; for the flora of even a temporary bank of silt that rises above the wash of ordinary tides in sea or river is extremely interesting, when considering geographical distributions and means of dispersal.

The contractions used in this place name list are the following:

E., East; G., Great; L., Little; M., Middle; N., North; Pl., Plantation; S., South; St., Railway Station; W., West; Wd., Wood.

The words 'both' or 'all' in parentheses after a parish name in this list implies that both or all the parishes of this name are in the division indicated.

Abney Wood .. 15
Aby 11
Acthorpe 8
Acres (The) 14
Addlethorpe 11
Agthorpe Wood .. 8
Ailby 11
Ailesham 3
Aisby (Gainsborough) 5
Aisby (Grantham) .. 14
Aisthorpe 6
Alford 11
Algarkirk 17
Algarkirk Allotment 14
Alkborough .. 2
Allen's Wood .. 3
Allington (E. & W.) 15
Althorpe 1
Alvingham 8
Amberhill 17
Amcotts 1
Ancaster 15
Ancroft Fen 1
Anderby 11
Ann Cover 3
Anthony's Clump .. 3
Anthony's Cover .. 3
Anwick 14
Apley 7
Appleholme 8
Appleby 2
Asfordby 11
Asgarby (Sleaford) .. 14
Asgarby (Spilsby) ... 10
Ashby (Brigg) .. 2
Ashby (Grimsby) .. 4
Ashby (Partney) .. 11
Ashby (West) .. 10
Ashby-de-la-Launde 13
Ashby Puerorum .. 10
Ash Holt 7
Ash Lound 13
Aslackby 16
Asserby 11
Asterby 8
Aswardby (Falkingham) 14
Aswardby (Spilsby) 11
Atterby 5
Aubourn 13
Audleby 3
Aukborough 2
Aunby 16
Aunsby 14
Austendyke .. 18
Austen Fen 9
Austerby 16
Auster Wood .. 16
Autby 8
Authorpe (Muckton) 8
Authorpe (Hogsthorpe) 11
Aveland 16
Axeltree Hurn .. 9
Aylesby 4
Ayscoughfee Hall .. 18
Azeby 14

Back Oak Wood .. 16
Badger Hills 3
Badger Hills 4
Badger Moor Wood .. 7
Bag Enderby 10
Bagmoor 2
Bamburgh 7
Bamber Bridge .. 9
Bardney 7
Barf (Beelsby) .. 4
Barf (Blankney) .. 13
Barf (Howsham) .. 3
Barholme 16
Barkstone 15
Barkwith (E. & W.).. 7
Barlings 6
Barnacle Pits.. .. 15
Barnetby-le-Wold .. 3
Barnoldby-le-Beck .. 4
Barnsdale (Eagle) .. 13
Barrowby 15
Barrow-upon-Humber 3
Barton-upon-Humber 3
Bassingham 13
Bassingthorpe .. 15
Baston 16
Baumber 7
Bayard's Leap .. 13
Bay Hall 12
Bayons Manor .. 7
Beacon Hills (Barton) 3
Beacon Hill (Marsh Chapel) 9
Beacon Hill (Thorpe-on-the-Hill) 13
Beaconthorpe.. .. 4
Beadhouse Wood .. 10
Beats (G. & L.) .. 10
Beckering 7
Beckingham 13
Beckingham Shores (Twigmoor) 2
Becklands 4
Bedlam Wood (Brocklesby) 3

Bedlam Wood (Wainfleet St. Mary) 12
Beech Holt 14
Beelsby 4
Beesby (Hawerby) .. 8
Beesby-on-the-Marsh 11
Belchford 10
Belleau 11
Belmont 15
Belmount 10
Belnie 17
Beltoft 1
Belton (Grantham) .. 15
Belton-in the-Isle .. 1
Bendon's Cover .. 5
Benington 12
Bennington (Long) .. 15
Bennington Grange .. 15
Benniworth 7
Betty Green 9
Bickar 17
Bigby.. 3
Billingborough .. 16
Billinghay 14
Bilsby 11
Binbrook 8
Birch Holt 13
Birch Plot 13
Birch Wood 5
Bird Hag 10
Birdock Gate .. 15
Birds' Drove 17
Birke Wood 7
Birkholme 15
Birk's Wood.. .. 10
Birthorpe 16
Biscathorpe 8
Bishop Bridge .. 5
Bishop Norton .. 5
Bitchfield 15
Blackmills 3
Blackmoor 13
Blankney 13
Bleasby 7
Bloxholm 14
Blow Wells (Barton) 3
BlowWells(Little Coates) 4
Blow Wells (Tetney) 9
Blubber Hill 13
Blue Hills 11
Blyborough 5
Blyton 5
Boat Mere Creek .. 18
Bogmoor (Manton) .. 2
Bole Ferry 6
Bolingbroke 10
Bonby 3
Bonsdale 5
Bonthorpe 11
Boothby Graffoe .. 13
Boothby-in-the-Marsh 11
Boothby Pagnall .. 15
Booths 13
Boston .. 12 and 17
Boswell 8
Botany Bay 9
Bottesford 2
Boughton 14
Bounston Hill .. 14
Boultham 13
Bourn 16
Bowin 16
Bowland's Cover . 4
Bowthorpe 16
Braceborough .. 16
Bracebridge 13
Braceby 15
Bracken 13
Brackenborough .. 8
Brackendale Cover .. 13
Bracken (Pl.) .. 13
Bradley 4
Braithing Bridge .. 13
Brakin 1
Brakon Wood .. 10
Bramble Holt .. 13
Brampton 6
Brampton Firs .. 3
Brand End Plot(G. & L.) 17
Brandon 15
Brandy Wharfe .. 5
Bransby 6
Branston 13
Branswell 14
Brant Broughton .. 13
Bratland's Cover .. 4
Bratoft 11
Brattleby 6
Brauncewell 14
Breachom's Wood .. 16
Bready Wood .. 15
Break's Holt.. .. 13
Breast Sand 18
Breeder Hills .. 15
Bridge End 16
Brigg (Glamford) .. 3
Brigsley 4
Brindwell 16
Brinkhill 10
Broadgate 18
Broadham's Cover .. 2
Brocklesby 3
Broom Hill 13
Brothertoft 17
Broughton (Brant) .. 13
Broughton (Brigg) .. 2
Broughton Clays .. 13
Broxholme 6
Brumby 2
Buckminster 16
Bucknall 7
Bulby.. 15
Bull Close Holt .. 13
Bullington (Goltho) .. 7
Bullington (Friskney) 12
Bully Hills 8
Bully Wells 14
Bumble Pit 14
Bunker's Hill .. 10
Burcom Sand .. 4
Burgh Beacon .. 7
Burgh-in-the-Marsh .. 11
Burgh-upon-Bain .. 8
Burnham (The Isle) .. 1
Burnham (Ulceby) .. 3
Burnt Wood 13
Burringham 2
Burtoft 17
Burton-by-Lincoln .. 6
Burton Coggles .. 15
Burton Ferry.. .. 6
Burton Gate 6
Burton Pedwardine .. 14
Burton-on-Stather .. 2
Burton Slate Wood .. 15
Burwell 8
Bushy Leys 16
Buslingthorpe .. 7
Butler's (Pl.).. .. 3
Butterbump 11
Butterwick (Boston) .. 12
Butterwick (East) .. 2
Butterwick (West) .. 1
Button Cap Holt .. 11
Byard's Leap.. .. 13
Bytham (Castle) .. 15
Bytham (Little) .. 15

Cabbage Wood .. 14
Cabourn 3
Cadeby 8
Cadney 3
Cadwell 8
Caenby 6
Caistor 3
Calceby 11
Calcethorpe 8
Callow 7
Cammingham .. 6
Campney Lane .. 7
Candle Bottom .. 10

Candlesby 11
Canwick 13
Careby 16
Carlby 16
Carlton-by-the-Ashes 15
Carlton (Castle) .. 8
Carlton (G.) 8
Carlton-le-Moorlands 13
Carlton (L.) 8
Carlton (N.) 6
Carlton Scroop .. 15
Carlton (S.) 6
Carr Holt 4
Carr House 1
Carr (W.) 1
Carrington 10
Caseby Wood .. 15
Casewick 16
Casthorpe 15
Castle Bytham .. 15
Castle Carlton .. 8
Castle Dyke Wood .. 14
Castle Hill Place .. 1
Castle Hills 3
Castlethorpe 2
Cathorpe 11
Catley 14
Cawkwell 8
Cawthorpe (L.) .. 8
Cawthorpe (Bourn) .. 16
Cawood Hall 17
Cay Leys Wood .. 3
Caythorpe 13
Central Wingland .. 18
Chapel Hill 14
Chapel (Mumby) .. 11
Chase Hill 3
Cheal 17
Cherry Holt 15
Cherry Willingham .. 6
Church End 12
Church Town .. 1
Cindersom Well .. 13
Claxby (Alford) .. 11
Claxby (Normanby) . 7
Claxby Pluckacre .. 10
Clay Hills Wood .. 15
Clay Hole 12
Claypole 15
Claythorpe 11
Cleatham 5
Clee 4
Cleethorpes 4
Clixby 3
Clough 17
Clough Bridge .. 11
Cloven Hill 10
Clump Hill 7
Coates (G.) 4
Coates (L.) 4
Coates (N.) 9
Coates (Willingham) .. 6
Cocked Hat (Pl.) .. 13
Cockerington (N. & S.) 8
Cocklode Wood .. 7
Cold Bath House .. 6
Coldham Quarter .. 13
Cold Hanworth .. 6
Coldstead 7
Coleby (Lincoln) .. 13
Coleby (West Halton) 2
College Wood .. 3
Collow 7
Colsterworth 15
Combe Hill (Denton) 15
Common Side .. 12
Coney Wood 11
Coneysby 2
Coningsby .. 10 and 17
Conisholme 9
Conyer's Wood .. 7
Cooksey's Cover .. 6
Copping Syke .. 10
Corby 15
Corking Bridge .. 16
Corringham (G. & L.) 5
Cotehouses 5
Cotes Grange 8
Counessome Cross .. 8
Counter Close .. 2
Counter Drain .. 16
Counter Drove (St.) .. 16
Counthorpe 15
Court Leys 13
Covenham (both) .. 8
Covers (The) .. 8
Covey Wood .. 11
Cowbank 11
Cowbit 18
Cowdyke (Pl.) .. 8
Cowgate Copse .. 16
Cow's Dyke 16
Coxey Hills 8
Crab Tree Holt .. 8
Craise Lound 1
Cranwell 14
Cream Pot Wood .. 7
Creeton 15
Cressy Hall 17
Croft 11
Crofton 14
Crosby 2
Cross Close Holt .. 13
Crossholme 5
Cross Keys Wash .. 18
Cross Moors 7
Crowland 16
Crowle 1
Croxby 4
Croxton 3
Culverthorpe 14
Cumberworth .. 11
Curdle Well 13
Cuxwold 4

Dalby 11
Dalderby 10
Dales Bottom .. 4
Dame Amos' Holt .. 18
Dam Ring 15
Dandy Holt 13
Dane Hill 16
Daubers Hill 4
Dawesmere 18
Daw Wood 10
Decoy Cottages (Brigg) 2
Decoy Plantation (Grimsby) 4
Deep Dale 8
Deeping (E. & W.) .. 16
Deeping St. James .. 16
Deeping Market . 16
Deeping St. Nicholas 16
Deer Park Wood .. 16
Delta Cover 3
Dembleby 14
Denton 15
Derrythorpe 1
Dexthorpe 11
Digby 14
Ding Dong 7
Dirrington 14
Dobbin Wood .. 16
Dob Wood 16
Doddington (Skellingthorpe) 13
Doddington (Dry) .. 15
Dogdyke 14
Dogdyke (St.) .. 10
Donington (Spalding) 17
Donington-on-Bain .. 8
Donna Nook 9
Dorrington 14
Dotsey Wood .. 15
Dove Cote 8
Dovedale 8
Dow Dyke 17
Dowsby 16
Dovesdale 18
Drainage Marsh .. 17

Drainage Fen 17
Driby 11
Drove End 18
Dry Doddington .. 15
Dukes Wood 15
Dumpin's Nook .. 10
Dunham Bridge .. 6
Dunholme 6
Dunkirk Cover .. 3
Dunsby St. Andrew 14
Dunsby (Bourn) 16
Dunstall 5
Dunston 13
Dyke (Bourn) .. 16
Dyke Fen 16
Dyke Outgang .. 16
Dyke Wood 16

Eagle 13
Eagle Barnsdale .. 13
Eagle Hall 13
Eagle Woodhouse .. 13
Ealand 1
East Fen 12
East Ferry 5
Eastholme 9
Eastlands Gorse .. 16
Eastoft 1
Easton 15
East Lound 1
East Thorpe 6
Eastville 12
Eaudyke 17
Eaugate 18
Edenham 16
Edlington 10
Elkington (N. & S.) .. 8
Ellarow Wood .. 12
Elsey 11
Elsham 3
Elsthorpe 16
Emswell 5
Enderby (all) 10
Epworth 1
Eskham 9
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Falkingham 16
Farforth 8
Farlsthorpe 11
Farthorpe 10
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Fen (W.) 10
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Fen Houses (Wigtoft) 17
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Folkingham 16
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Gainsthorpe 2
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Garnsgate 18
Garthorpe 1
Garwick 14
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Gatliffe Wood .. 7
Gatt Sand 18
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Gedney Hill (St.) .. 18
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Gillian Holt 8
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Girsby 8
Glanford Brigg .. 3
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Gokewell 2
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Grime's Holt .. 4
Grimoldby 8
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Haceby 14
Hackthorn 6
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Hag Wood 13
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Hamilton Hill .. 15
Hammock Beck .. 17
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Hare Booth 7
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Harlaxton 15
Harmston 13
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Harts' Grounds .. 17
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Haseby 14
Hasethorpe 11
Hatcliffe 4
Hathow 6
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Haven Bank 10
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Hawerby 8
Hawstead Wood .. 10
Hawthorn Hill .. 10
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Heck Dyke 1
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Heighington 13
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Helpringham 14
Helsey 11
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Hemswell 5
Hendale Wood .. 3
Henhole Wood .. 4
Hericho Wood .. 15
Hermitage Hill .. 11
Heron Wood (Broughton) 2
Heron Wood (Doddington) 13
Hibaldstow 2
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Honey Close (Pl.) .. 3
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Hook Hill 12
Hopland (Pl.) .. 11
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Horbling 16
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Infield Wood.. .. 14
Ingham 6
Ingleby (all) 6
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Ingram Gorse .. 7
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Irby-in-the-Marsh .. 11
Irford 4
Irnham 15
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Keisby 15
Kelby 14
Kelfield 1
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Kelsey (S.) 7
Kelstern 8
Kenwick (Louth) .. 8
Ketsby 10
Kettleby 3
Kettlethorpe 6
Kew's Holt 6
Kexby 6
Kib Wood 2
Killingholme (N. & S.) 3
Kinaid Ferry.. .. 1
Kingerby 7
Kingsforth Hall .. 3
Kingsthorpe 7
Kingston Wood .. 16
King's Wood .. 10
Kirkby (E.) 10
Kirkby Green .. 13
Kirkby-la-Thorpe .. 14
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Kirkby Underwood .. 16
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Kirmington 3
Kirkmond-le-Mire .. 8
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Knaith 6
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Langton (Spilsby) .. 11
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Langworth 6
Laughterton 6
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Laughton (Gainsbro') .. 5
Lavington 15
Lawless Wood .. 7
Lawn Wood (both) .. 10
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Laythorpe 10
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Leake (both) 12
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Lenton 15
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Lincoln Heath .. 13
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Long Sand 12
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Martin (Horncastle) .. 10
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Masson Hall 12
Marvis Enderby .. 10
Mawthorpe (Well) .. 11
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Meagrim Hall .. 11
Medlam 10
Megtree Hill 13
Melton Ross 3
Mere 13
Merrishaw's (Pl.) .. 14
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Metheringham .. 13
Mickleburg 11
Mickleholme .. 6
Mickley Wood .. 15
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Middlethorpe .. 10
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Milner Wood .. 3
Miningsby 10
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Monksthorpe .. 11
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Navenby 13
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Neville Wood .. 13
Newball 7
Newbigg 1
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Newclose Wood .. 3
New Decoy Wood .. 13
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Newland 1
Newpark Wood .. 7
Newsham 3
Newstead 3
Newton-by-Falkingham .. 14
Newton-by-Toft .. 7
Newton-le-Wold .. 8
Newton-on-Trent .. 6
New York .. 10
Nineteen Pound .. 16
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Nocton 13
Norlands 10
Normanby (Scunthorpe) 2
Normanby (Spittal) .. 6
Normanby (Stow) .. 6
Normanby-le-Wold .. 7
Normanton 15
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North Drove (St.) .. 17
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North Forty Foot Bank 17
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Northorpe (Thurlby) .. 16
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Northway Pond .. 13
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Norton Disney .. 13
Norton Wood .. 6
Nun Cotham 3
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Old Orchard 13
Old Park Wood .. 15
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Old Wood 13
Orby 11
Orford (Binbrook) .. 8
Orford (Stainton-le-Vale) 4
Orgarth Hill 8
Ormsby (N.) 8
Ormsby (S.) 10
Osbournby 14
Oseby 14
Osgodby (Grantham) .. 15
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Otby 7
Outer Knock 11
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Roxby 2
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Spellow Hills .. 11
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Stainton (Langworth) 7
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Stroxton 15
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Swineshead 17
Swinethorpe 13
Swinhope 8
Swinn Wood 11
Swinestead 15
Swinthorpe 7
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Temple Bellwood .. 1
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Thirkington Wood .. 13
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Thoresby (S.) .. 11
Thoresthorpe 11
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Thurlby (Bourn) .. 16
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Tiger Holt 6
Tillbridge Lane .. 6
Tilney (Thorpe) .. 13
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Toft (Newton) .. 7
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Tumby 10
Tumman's Wood .. 13
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Upton 6
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Waddington 13
Waddingworth .. 7
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Walcot (Alkborough) 2
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Washingdales Wood .. 4
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Waterloo Wood .. 10
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Welbourn 13
Welby 15
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Welhams 3
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Wellsdale Bottom .. 8
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Welton-le-Wold .. 8
Welton (Lincoln) .. 6
Welton Wood .. 11
Wenghale 7
Westborough 15
Westby 15
West Carr 1
West End 17
West Fen 10
Westgate 1
Westhorpe 17
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West Mark Knock .. 18
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Westville 10
West Wood 13
West Woodside .. 1
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White Pit 10
White Wood 5
Whitton 2
Wickenby 7
Wickham 18
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Wildsworth 5
Wilksby 10
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Willoughby (Scot) .. 14
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Willoughby (West) .. 15
Willoughton 5
Wilsford 14
Wilsthorpe 16
Winceby 10
Windle Bridge .. 5
Winghale 7
Wingland (Central) .. 18
Winsoever 18
Winteringham .. 2
Winterton 2
Winthorpe 11
Wirehill 7
Wisby 13
Wispington 7
Witham (N. & S.) .. 15
Witham-on-the-Hill .. 16
Withcall 8
Withern 11
Woldale Trees .. 8
Wold Newton .. 8
Wood Enderby .. 10
Wood Nook 15
Woodhall 10
Woodhall Spa .. 10
Woodhouse 1
Woodside 10
Woodthorpe 11
Woolfits (Pl.) .. 13
Woolsthorpe 15
Wootton 3
Worlaby (Brigg) .. 3
Worlaby (Louth) .. 10
Wothorpe 16
Wragby 7
Wragholme 9
Wrangle 12
Wrawby 3
Wrongsome Holt .. 13

Wroot 1
Wyberton .. 10 and 17
Wyche Drain .. 11
Wyham 8
Wykeham (E. & W.) 8
Wykeham (Spalding) 18
Wykes 17
Wyville 15
Yaddlethorpe 2
Yarborough 8
Yarborough Camp .. 3
Yawthorpe 5

LINCOLNSHIRE NATURAL HISTORY.

By JOHN CORDEAUX, M.B.O.U.,*
Great Cotes R.S.O., Lincolnshire.

IN rising to address you on this occasion, I am not unmindful of the fact that I have been elected first President of the Lincolnshire Naturalists' Union, and I wish now, in the first place, to thank you for having placed me in so honourable a position. The object of our Society is intended to bring about a thorough and systematic investigation of the Natural History capabilities of the county, carried on year by year, a publication, if possible, from time to time, of the results, and an endeavour to create amongst all classes of the population an intelligent interest and correct appreciation of the various natural phenomena which surround them.

It is somewhat of a reflection on this great county that so little has been done hitherto for the cause of science; this, indeed, becomes painfully apparent when we consider the excellent results shown by the enterprising naturalists in the two neighbouring counties of Norfolk and Yorkshire. In the former, the "Norfolk and Norwich Naturalists' Society" was formed in 1870, and published their first report; the number of members is now 250. The "Yorkshire Naturalists' Union" came into existence previous to 1883, and the number of its members is nearly 600. Both these, like our own, had small beginnings; they have, however, succeeded in extending the knowledge of local Natural History. In looking forward to the future, I can see no reason whatever to think that our own Union will not be equally successful, and certainly in this great and diversified county it will never lack material to work on or fall short in variety and interest of subjects.

So far, our efforts have been individual ones, and isolated and spasmodic: now, as a united band and numbering specialists

* An address, delivered at Lincoln, May 24th, 1894, to the Lincolnshire Naturalists' Union, by the First President (1893).

in various branches, we shall become a representative body having a local habitation and name, and have much greater facilities for an exchange of opinion and for the proper collection and diffusion of facts. It must not, however, altogether be inferred that nothing has hitherto been done by the sons of Lincolnshire for the increase of physical science; indeed, we have just cause of pride to see in our roll of honour such names as Isaac Newton, of Woolsthorpe; Matthew Flinders, of Donington; John Franklin, of Spilsby; Joseph Banks, of Revesby Abbey; and more recently, Charles Anderson, of Lea. Of those now living, either within or without our boundaries, who are doing good work, it would be invidious to make direct personal mention; sufficient is it to say that we include amongst ourselves all that is both necessary and capable for making this Union a great and a lasting success.

Lincolnshire is the second largest county in England, its total length being 75 miles by 45 in breadth, and containing 1,783,769 acres, 85 per cent. under cultivation. The surface presents a very considerable diversity of character, sea-coast, marsh, wold, moor, heath and fen, and some very considerable woodlands with much pleasant and typical scenery without anywhere rising into the grand and strikingly picturesque.

The county is not readily divided into what are called faunal areas—that is, districts more or less compact, with well-defined boundaries, between which—one or the other—faunal distinctions can be clearly established. In taking a general survey of the whole area it appears capable of being irregularly divided into at least six fairly marked districts; these are—

I.—The Marsh and Middle Marsh—which is the whole of the great alluvial flat which lies between the east coast and the foot of the chalk wolds, as far as Spilsby.

II.—The Fens—south of Spilsby and Wainfleet and east of Billinghay, Heckington, Bourn, and Market Deeping, with a branch extending westward of the Witham to Lincoln.

III.—The Chalk Wolds.

IV.—The Heath—an irregular district, partly on the oolite and partly on the lias, and not easily defined. In its more southern portion it is split into two arms by the Witham valley. It runs from S.E. to N.W., and includes the heaths near Woodhall Spa, the moorland near Market Rasen and below Caistor, and the commons and rabbit-

warrens between Gainsboro' and Frodingham, in the north-west of the county.

V.—A portion of Kesteven, south of Grantham and east of Belvoir, of which Corby is about the centre, well-wooded, picturesque, and highly cultivated, and containing noble parks and country seats.

VI.—The Isle of Axholme, formerly moor, bog, and widely extending heath and low firwood, but now 50,000 acres of rich warp, and bounded to the north-west by the great level of Thorne waste in Yorkshire.

It must be clearly understood, however, that these divisions are only approximate, and that with our present knowledge no absolutely hard and fast lines can be laid down defining faunal areas, and that there are yet portions of the county which it is difficult to range under any of these divisions. I have endeavoured to define roughly six fairly marked districts within the boundaries of Lincolnshire, and I shall now briefly enter more fully into the physical peculiarities of each, and endeavour to show that, notwithstanding the great changes which have taken place, these still possess attractions for the naturalist. I would also mention those special matters which require more careful working out.

In the Marsh and Middle Marsh is included the whole of the low-lying plain between the foot of the chalk wolds and the sea, including the sea-coast itself and all its wide attractions. The chief interest of this district rests in its ornithology—more particularly in the spring and autumn—and in connection with the migration of birds. The total number of species which can fairly be admitted at the present time into the Lincolnshire avifauna is somewhat doubtful. In the Humber district up to this date I have been able to record 290. This compares favourably with the Norfolk list of 293, and Yorkshire with 310. With our present knowledge as to the frequency with which rare birds turn up during the period of migration, far out of their ordinary route, I think we should attach very little importance to the increase of any local or county list by the addition of mere wanderers. The record of such is interesting as showing how far some birds get driven out of their normal course. The chief additions to the Humber district in late years have come from Spurn, but there is no reason why equally good results should not be obtained from our own coast.

The flora of the marshes and the sea-coast is a very attractive and interesting one, and our knowledge of the same, as well as of Lincolnshire botany generally, has been greatly increased by the researches of the Rev. W. Fowler, of Liversedge; Dr. F. Arnold Lees, of Harrogate; the Rev. Adrian Woodruffe-Peacock; Mr. F. M. Burton; Mr. O. Thimbleby, of Spilsby, and others.

The collection of facts in connection with this district commenced as far back as 1590, and the great naturalists of former days—Gerarde, Ray, Dr. Martin Lister, and Sir Joseph Banks—have each in turn visited and investigated its floral treasures.

Before leaving this portion of the county I should like to call attention to the marine mammalia, the seals, and various forms of whale, grampus, porpoise, and dolphin. Although in recent years considerable additions have been made to our local list, we still require much further knowledge and more scientific investigations. The capture of a seal or the stranding of a whale—and such occurrences are by no means unfrequent—should at once be noted, and an examination carried out on the spot, careful notes and measurements made, the skull, at least preserved, and where possible a photograph taken before the carcase is removed. In this branch of zoology, as well as ornithology, the official representative of our Vertebrate Section, Mr. G. H. Caton Haigh, has done some excellent work. There is, so far as I know, no list of marine fish; the collection of facts in connection with these and with Marine Zoology generally, might well be taken up by those members who live near or have most frequent access to the coast. The Entomology, more particularly in this district the Aquatic-entomology, Conchology, and Micro-zoology and Botany, also present wide fields for close and careful study. In the former we have in the Rev. Canon W. W. Fowler, a member whose reputation as an entomologist is not only local and national, but world-wide. We must not fail to recognise, also, the good services rendered by Mr. H. W. Kew, formerly of Louth, and Mr. James Eardley Mason, of Alford.

There is no other faunal area in Lincolnshire where the old glories have so entirely vanished as in the fenland, formerly a vast level of peat-moor, morass and bog, with league beyond league of shallow mere, interspersed with a vast growth of reed and bull rush and various water-loving plants, and on the drier portion deep sedge and doubtless some rich pasturage, with

thickets of sallow, willow, birch, and sweet-gale, which before the dawn of history had usurped the place of oak, Scotch fir, and yew. The whole of this vast level was a paradise for wild creatures, beast, bird, and fish, and predominate over all, upon the peat-stained waters of the shallow lagoons floated primitive man in a canoe dug out from a single tree, and using weapons tipped with fractured flint or fish-bone.

Of the natural treasures of the old fenland we have but scant record. Unfortunately our forefathers, when they did write, cared little for depicting their natural every-day surroundings, yet we must be thankful for the few precious records which have come down to us of those olden times, and enable us to form some idea of the extreme richness of the Fen fauna and flora, from the *Liber Eliensis;* the Chronicles of Crowland; and the writings of William of Malmsbury (1200); Thomas Fuller; Camden's Britannia (Gough's edition); and the naturalists Pennant, Ray, and Colonel Montagu; also the quaint verses left by Michael Drayton in the Polyolbion; and by "Antiquary Hall," of Llyn, in the doggerel rhymes depicting a fenman's daily life.

One aim of our Society should be the collection of any scrap, oral or written, in connection with physical-archæology, and any who have opportunities of inspecting old deeds, letters, and family account books, will do good service by extracting any small matter which directly or indirectly bears on this subject. Such entries were, no doubt, considered most trivial by the original writers, but in the light of the present day they are of much interest and importance. To cite one or two instances alone, how little historical record is left of the Great Bustard in Lincolnshire. The late Sir Charles Anderson, of Lea, in 1874, sent me extracts from an old account book kept by Charles Anderson, at Broughton, near Brigg, from 1669 to 1673:—

"1670, September 26—To John Hall, brought curlew - 1s.
„ October 23—Item to Thos. Beckett for killing two Bustards - - - - - - 2s.

Then there is a letter from the great Dr. Johnson, dated January 9th, 1758, to his friend, Bennet Langton of Langton, acknowledging the receiving a parcel of game, amongst other things a bustard which he gave to Dr. Lawrence.

A letter written to myself by the Rev. Edward Elmhirst, November 29th, 1886, containing personal recollections of Lincolnshire ornithology, also his communication made to the

Field newspaper, November 28th, 1886, concerning the former nesting of the Hen Harriers in the moors near Market Rasen, are amongst the most valuable contributions to the records of county natural history in recent years.

Of infinite interest also, as throwing light on the past, would be the account books and records of captures made in the duck-decoys at one period so common in the marsh and fen. We have never met with more than one decoy book, namely, the well-kept register of the Ashby Decoy, near Brigg, worked successfully for so many years by Captain Healey.

So marvellously abundant were wildfowl before the fens were drained that we are told a flock of wild ducks has been observed passing along from the north and north-east into the east fen, in a continuous stream for eight hours together.

Our next faunal area is very distinct and well-marked—the Chalk Wolds—in its greatest length from Barton-on-Humber to Burgh, fifty-two miles, and the greatest breadth near Market Rasen, fourteen miles; and the highest point of the range, 549 ft., is near Normanby Clump, and this is the highest land in the county. Before the general enclosure at the commencement of the present century the wold was a wild and open region, a rolling upland, more or less intersected by deep valleys. These rounded hills were covered with heather and heaths, coarse rough grasses, like the barren brome, and *Aria cæspitosa* the tufted hair-grass, the most graceful if the most useless of all, with thousands of acres together of gorse, and ancient thorns in clumps and single. It was a district most admirably fitted to the habits of that noble bird the Great Bustard, and the Stone Curlew, the former probably becoming nearly extinct before the commencement of the century, and the latter still holding its own —a few pairs annually nesting, but not now on the wold.

During the last quarter of the century much good work has been done with Lincolnshire geology, the most important reports being in connection with the extension of the Rhœtic beds, near Gainsborough, by Mr. F. M. Burton, also his examination of these and the Keuper Sandstones in the same district; Professor Judd's paper on the Neocomian strata; Professor Morris on some Oolite sections; Canon J. E. Cross on Lincolnshire Oolites and Lias; also Mr. Clement Reid's work in connection with the new Geological Survey amongst the boulder-clays, inter-glacial beds, marine gravels, post glacial beds and alluvium of Northern Lincolnshire.

In connection with our Geological section I would suggest the appointment of a boulder committee, whose object will be to take observations relative to the erratic or ice-borne blocks of Lincolnshire, their character, position, size, origin and height above the sea. This to be carried out on the same lines generally as those adopted by the boulder committee of the British Association.

The two distinct ranges of chalk and oolite which run from south to north of the county form elevated tracts, which in their original condition were heath and moorland, and almost destitute of timber trees. Along the flanks of these hills and in the intervening low country stretched the deep forests of Kesteven and Lindsey—the Bruneswald—oak, ash, elm, beech, fir, holly, yew, and hazel, sufficient remains existing in some of our oldest woodlands to recall the ancient glories of the land. No better "happy hunting grounds" remain to reward the naturalist than these comparatively undisturbed areas. Here in 1884 an example of the old British wild cat (*Felis catus*) was taken, and the pine marten (*Martes abietum*) can scarcely yet be extinct; bones of red deer, *Bos longifrons*, wolf, wild boar, and beavers, have been found in the becks. We have as yet no list of Lincolnshire mammals, and I shall be greatly indebted to any of our members who will enable me to complete a list, which is already partially prepared, with notes from their respective districts.

The heath is another most charming faunal area, from the fact that some few scattered portions are still in their primitive condition, as in the neighbourhood of Woodhall Spa and the warrens and commons of Scotton, Manton, Twigmoor, Crosby and Brumby, in the north-east. The Ermin Street, that great military highway of the Romans, which passed through the gates of their chief fortress, Lincoln, followed the ridge of the oolite from south to north—to east and west of this was a wide, open and continuous stretch of elevated tableland, the road running through leagues of purple heather, where the pink and purple shading of the common and cross-leaved heaths intermingled with the yellow blooms of the petty whin and sheets of pale blue hairbell, and the darker blue gentian (*Gentiana pneumonanthe*). A glorious land it was to cross in those days: the long, lone, level line of a well-kept war path, stretching like a ribbon over the heath, and marked at short intervals with high stones or posts as a guiding line in fog or snow, in a solitude but rarely broken, except by the footfall of

the legionaries and the dismal creakings of the baggage trains and provision carts, while above, under the blue heaven, the lark carolled as it does now, and the plaint of the golden plover sounded sweet from off the moorlands.

The north-east corner of Lincolnshire, notwithstanding recent changes and trade encroachments, is still rich in animal and plant life, and presents a wide field for future research. Further westward, and beyond the Trent, lies the Isle of Axholme; some portion adjoining the great deer chase of Hatfield and Lindholme, in Yorkshire, was once the hunting-ground of English kings. We must turn to the pages of historians, such as Leland, De la Pryme, Dr. Stonehouse and others if we wish to learn its ancient condition before the enterprise of the Dutchman Vermuyden transformed its wastes and swamps and demon-haunted solitudes into fertile lands, and at the same time banished its indigenous flora and fauna. In fact, the entire district, including Thorne waste, beyond our border, and portions also east of Trent, resembled the "tundras" of Lapland and northern Asia, and, like these, was the breeding-home of innumerable wildfowl and waders. Most suggestive of a not remote Arctic character are the lingering of such plants as *Selaginella selaginoides*, *Lycopodium alpinum*, recently discovered by the Rev. W. Fowler, also *Andromeda polifolia*, and *Empetrum nigrum*, on Thorne waste, *Myrica gale*, generally, and the impressions of leaves of some Arctic willow in the laminated silts and peaty alluviums.

Of our sixth district, that south of Grantham and east of Belvoir, I can tell you little, for excepting in passing through by rail, it is a *terra incognita* to me. The chief attraction is Grimsthorpe Park, which contains many fine oaks, hornbeams and hawthorns, and a small herd of red deer—interesting as the only one left in the county, and descendants of those indigenous deer which at one period wandered wild, free and unrestricted through the length and breadth of the land.

It is customary on these occasions briefly to notice the work done by the Union during the President's year of office. Two meetings have been held, the first at Mablethorpe, on June 12th, about thirty attending, and Professor L. C. Miall, F.R.S., of the Yorkshire College, presiding. The vertebrate section (ornithology) was, perhaps, the most successful. The full report of this very interesting meeting will be found in "The Naturalist" for August and September, this year.

The Rev. C. W. Whistler found the Natterjack toad (*Bufo calamita*) on the sand-hills. This is an interesting reptile and very different from the common toad. It is a light yellow colour, and never leaps nor does it crawl, its progression being more like a run. This toad was first discovered near Revesby Abbey, by Sir Joseph Banks, who made it known to the naturalist Pennant. Its distribution is somewhat remarkable, for it is found not only in England, but also in localities in Ireland, where the common species is unknown. All the Irish snakes and toads, as you know, were turned into stone by St. Patrick, but this seems to have escaped the wrath of the Saint. The inference is that the Natterjack succeeded in reaching Ireland before that distressful isle had become severed from Great Britain, which the common toad did not do, so we must consider the former is the older immigrant of the two; perhaps its particular mode of progress afforded better and more favourable facilities for getting over the ground.

In our investigations into the natural history of this county, we must remember that at no very distant period Lincolnshire was part of the mainland of Europe, and there was no North Sea as we know it now, and we must therefore expect to find close affinity between the fauna and flora on both sides of the water. Once, no doubt, a great central river, whose debouchure was over the Dogger Bank, received the waters of the rivers from each side. The North Sea, if you will take the trouble to look at Mr. Olsen's map, is little more than a great plain covered by shallow water; off the north-east coast of England it is twenty fathoms, and as we go south even this depth is exceptional. The North Sea contains some remarkable depressions, one of which, the Silver Pit, is a narrow submarine valley fifty fathoms in depth, forty miles off the north-east coast of Lincolnshire. The intrusion of this great water, the North Sea, between ourselves and the continent may have been very rapid, for when the chalk barrier, which presumably at one time extended eastward from Flamboro' Head (cropping out again round Heligoland), was once breached and the central river taken in flank, there is no reason why the great level plain of intermediate Lincolnshire should not have been submerged in a period even of a few days.

The second meeting was at Woodhall Spa, on August 7th, with a very fair attendance of members, who were taken over the ground by the Rev. J. Conway Walter. The day was very hot, scarcely any birds were seen and very few insects

taken. The botanical section was, however, most successful, and several rare plants were found, the most interesting, perhaps, being the lovely dark blue gentian, in damp places on the moor. I must take this opportunity of publicly expressing the thanks of the Union to our Secretary, Mr. Walter F. Baker, whose untiring and intelligent exertions and great aptitude for organisation have done so much in setting us in motion and making the Union a success.

Before closing these remarks—as we are now engaged in rocking the cradle of the Union—I should like to say a few words as to the possibilities of a future, and the taking up of a useful position. There is no other county in England in which the fauna and flora have so greatly altered; large numbers of birds, insects and plants have been altogether destroyed, or, in the former case, driven away by enclosure and drainage. It becomes therefore an imperative duty that we should use our best endeavours to preserve what is left and to take care that our scarcer mammals, nesting birds and surviving plants are not ruthlessly destroyed and unnecessarily banished. There is no sadder chapter to read than that on "Extermination," in Professor Newton's recently published Part I. of "A Dictionary of Birds;" it is a record of a destruction and waste of life in this fair world, brought about directly or indirectly by the ignorance, avarice, and greed of civilised man, assisted in late years by that rage for wearing feathers that now and again seizes civilised women.

Much might be accomplished if we could give our people an intelligent knowledge of their natural surroundings and an interest in their preservation. It would be a step in the right direction if object lessons were occasionally given in our village schools in connection with Natural History, illustrated from those easily accessible raw materials of observation in the neighbourhood, which would best illustrate the every-day life of plants and animals.

I fear there is no class of men who, considering the very favourable opportunities they have, are so proverbially ignorant of the economy of out-door life as the gamekeepers, and so systematically destroy what it is often their best interest to preserve. Agriculturists, too, as a class, with but few exceptions, are deplorably indifferent to, and ignorant of, the most elementary principles of Natural Science. They care for none of these things. In looking back, however, I am proud to admit many genuine services rendered by agricultural

labourers, who have walked miles to bring some curious object, or to tell of some strange beast or bird seen during their daily toil.

Unfortunately, in England the inculcation of scientific knowledge is left almost entirely to private enterprise and in the hands of such societies as ours. This is not the case in foreign states, and notably so in America, where neither pains nor expense are spared in instructing the people. I have now before me a volume, most beautifully illustrated, recently published and issued by the American Government Department of Agriculture, on "The Hawks and Owls of the United States." This book has been scattered wholesale, as a free gift, over the land, and is intended to teach the American farmer the great usefulness of birds of prey, and the good which, as a rule, they confer upon him. Surely we have had object lessons sufficient to bring this matter forcibly home to us in that plague of field voles which has laid waste some of the great sheep farms beyond the border, and the plague of rats in Lincolnshire.

It is hoped that in time we shall get a museum in Lincoln. The want of this has been the cause of our losing many art treasures, antiquities, and natural history specimens. We have lost the inimitable pictures of De Wint, the Franklin relics, and many other things which ought not to have left the county.

A word on our own individual and special duties as naturalists; and here I cannot do better than quote the words of a late Bishop of Oxford—the great Bishop Wilberforce. He says:—

"A good practical naturalist must be a good observer; and how many qualities are required to make up a good observer? Attention, patience, quickness to seize separate facts, discrimination to keep them unconfused, readiness to combine them, and rapidity and yet slowness of induction; above all, perfect fidelity, which can be seduced neither by the enticements of a favourite theory nor by the temptation to see a little more than actually happens in some passing drama."

In conclusion, it is gratifying to find that there is at least an awakening and uprising on these matters in Lincolnshire, and that the dry bones are moving. Let us trust that this Union—a real Union of hearts—will inaugurate a new era. The most wonderful fact in connection with the last half century has been the progress of science. Everywhere amongst the

educated and thoughtful there is a striving to search and probe downwards into the very sources and origin of all life—not alone that we may get a deeper insight into the workings of nature, but to find the key to our own position in connection with the life which is everywhere about us. Men of science are diligently engaged in painfully searching backwards into the infinity of the past, and, considering the results already attained, I think we can look forward with hope to the infinity of the future. Yet, I think, when science has spoken her last word, we shall still have to confess, in the words of Lincolnshire's noblest son, we are but

"An infant crying in the night:
An infant crying for the light:
And with no language but a cry."

THE LINCOLNSHIRE BOULDER COMMITTEE.

A COMMITTEE has been appointed by the L. N. U. for the purpose of recording all the facts they can collect concerning the erratics left by the great ice sheet that once overspread the county. It consists of the following members:—F. M. Burton, F.G.S.; J. H. Cooke, B.Sc., F.G.S.; H. Preston, F.G.S.; A. W. Rowe, F.G.S.; Percy F. Kendall, F.G.S.; E. A. Woodruffe-Peacock, F.G.S.; and W. Tuckwell. They wish that the following directions should be read over and acted upon in reporting to the Committee's Secretary.

Shortly, in case of haste, the following points should be noted:—

1. Dimensions of Boulder in length, breadth, height above ground.
2. Of what material composed; Blue-Stone, Red Granite, Grey Granite, Sandstone.
3. Rounded or angular, smooth or scratched.

More fully, the following:—

(*A*) Isolated Boulders.

1. What is the name of the Parish, Estate, and Farm on which Boulder is situated, adding nearest Town, and

County, and any particular enabling its position to be marked on the Ordnance map?

2. What are dimensions of Boulder, in length, breadth, and height, above ground?
3. Is the Boulder rounded, subangular, or angular?
4. If the Boulder is long-shaped, and has not been moved by man, what is direction by compass of its longest axis?
5. If there are any natural ruts, groovings, or striations on Boulder, state—
   (*a*) Their length, depth, and number.
   (*b*) The part of Boulder striated, viz., whether top or sides.
   (*c*) Whether the striations are in the direction of the longer axis, or at what angle to it?
   (*d*) Whether there is any difference of direction between the scratches on the upper surface and those on the lower surface? Give the compass bearing.
   (*e*) Whether there are any indications by which you can tell from which direction the several sets of scratches were inflicted?
   [*The scratches on the under side are commonly from the opposite direction to those on the upper surface, though parallel to them.*]
6. What is the nature of the rock composing the Boulder? If it is of a species of rock differing from any rocks adjoining it, state locality where, from personal observation, you know that a rock of the same nature as the Boulder occurs, the distance of that locality, and its bearings by compass from the Boulder.
7. If the Boulder is known by any popular name, or has any legend connected with it, mention it.
8. What is the height of the Boulder above the sea?
9. Is the Boulder indicated on any map, or does it make any boundary of a County, Parish, or Estate?
10. If there is any photograph or sketch of the Boulder, please to say how the Committee can obtain it?
11. Is the Boulder connected with any long ridges of gravel or sand, or is it isolated?
12. Upon what does the Boulder rest?

(*B*) Groups of Boulders.

1. What is the name of the Parish, Estate, and Farm on which they are situated, adding the nearest Town, and County, and any particular enabling their position to be marked on the Ordnance map?
2. What are the dimensions of the smallest and largest Boulders of the group?
3. Are the Boulders rounded, subangular, or angular?
4. If any large Boulder of the group (which has not been moved by man) is long-shaped, what is the direction by compass of its longest axis?
5. If there are any natural ruts, groovings, or striations on any Boulder, state—
   (*a*) Their lengths, depth, and number.
   (*b*) The parts of the Boulder striated, viz., whether top or sides.
   (*c*) Whether the striations are in the direction of the longer axis, or at what angle to it?
   (*d*) Whether there is any difference of direction between the scratches on the upper surface and those on the lower surface? Give the compass bearing.
   (*e*) Whether there are any indications by which you can tell from which direction the several sets of scratches were inflicted?
   [*The scratches on the under side are commonly from the opposite direction to those on the upper surface, though parallel to them.*]
6. State—
   (*a*) Localities where rocks undoubtedly of the same nature as the Boulders occur.
   [*Be careful to ascertain that none of the Boulders have been brought from a distance by human agency.*]
   (*b*) The distance of those localities and their bearings by compass from the Boulders.
7. What is the nature of the rocks composing the Boulders, and in what proportions do the Boulders of the various rocks represented in the ground occur?
8. What is the height of the group above the sea?
9. Over what area does the group extend, and what number of Boulders are there in the group or per acre?

With respect both to the isolated Boulders and groups of Boulders described, state whether they are exposed on the surface, or surrounded by any deposit. Describe the nature of any deposit containing Boulders, and state whether the imbedded Boulders are of the same character as those (if any) upon the surface.

Please forward reports, accompanied by a specimen of the rock, to the Secretary,

THE REV. W. TUCKWELL,
Waltham Rectory, Grimsby.

THE CONTENTS OF BIRDS' CROPS.

ON the 17th of March, Mr. F. A. Dorrington, of Nettleton Lodge, Caistor, sent me the contents of the crop of the Ring Dove—*Columba palumbas*, L. It was one of two birds shot a few days before in the wood round his place. The crop of the bird I did not receive was said to contain only the young spring leaves of the white clover—*Trifolium repens*, L. This was certainly the species of *Trifolium* I found in the packet I received mixed up with a mass of cylindrical root-fibres, some of which were rarely of a fusiform shape. At the first glance I mistook these for the root-fibres of the Heath Thistle—*Cnicus pratensis*, Willd.; a not uncommon species on sandy warreny ground like Nettleton, and common enough on Scotton Common and elsewhere. But after tasting the root-fibres of the Pilewort or Lesser Celandine —*Ranunculus Ficaria*, L., I came to the conclusion that the bird had been feeding on this plant, turned up on ground newly prepared for spring-corn sowing. The *Cnicus* is a rare plant in the neighbourhood, while the *Ranunculus* is common enough. This suggests the idea that very much might be learned concerning the varying food of our feathered population if sportsmen-naturalists would carefully examine the crops of all the birds they shoot. If any doubt arises, the contents should be put into a corked bottle and common lamp paraffin added. It is the cheapest and handiest preserving fluid I know, and has the great advantage that it does not take the colour

out of specimens—even tender plant colours—for weeks. I have by me some plants bottled in paraffin in June, 1892, as an experiment; the colours of the Forget-me-not, common rimrose, and red garden variety, Veronica (*V. Chamædrys*, L.), Daisy, and Dandelion, are still clearly distinguishable. When once bottled up and fully labelled, interesting finds can be sent on the most convenient opportunity to the nearest botanist, entomologist, &c., as the case may require.

E. Adrian Woodruffe-Peacock.

Cadney Vicarage, Brigg.

THE Goat Willow.—*Salix Caprea*, L. The common hive-bee (*Apis Mellifica*, L.) in scores were very busy gathering honey from a goodly-sized male tree of this species in Poolthorn Cover, Howsham, on March 21st, a very mild Spring-like day. On examination of a male catkin—the other sex is not yet open—the wedge-shaped nectary, which is to be found at the back of the two stamens, *i.e.*, between the essential organs of the flower and the stalk of the catkin, could be clearly seen tipped with honey. Observation was attracted to the tree by the humming of the bees. Notes on bees or any insects frequenting the catkins of other species of willows will be thankfully received, if specimens of the leaves and flowers accompany them.

The Editor.

THE Lincolnshire Rye-grass.—*Lolium perenne*, L. *stoloniferum*, G. Sinclair. "A specimen of the stoloniferous rye-grass was communicated by Mr. Whitworth, from his extensive collection at Acre House. Of late years much has been done in discovering new and improved varieties of *Lolium perenne*. Mr. Whitworth has devoted much attention to this subject, and the talents, judgment, and success he has displayed in this important inquiry, deserve very great praise. His collection of the varieties of *Lolium perenne*, in 1823 amounted to the surprising number of sixty."—G. Sinclair's *Hort. Gram. Wobur.* London, 1825. The Acre House in which Mr. Whitworth lived has disappeared from Normanby-le-Wold; but the site of its garden, where he carried on his experiments on the varieties of Rye Grass, is

still known. I hope to visit it this season. Can anyone give me further facts about the late Mr. George Whitworth, and supply me with specimens of his variety of *L. perenne*, L. ?

THE EDITOR.

THE 'BLUE STONE' BOULDER, LOUTH, LINCOLNSHIRE.

By W. HAMPTON, F.C.S., *Hanley*, AND H. WALLIS KEW, F.E.S., *Louth*.*

THE Louth 'Blue Stone' is a subangular boulder of a blue-black colour, about 32 inches in height and about 145 inches in girth, estimated to weigh from four to five tons, which has existed in Louth for centuries, and now rests in the yard of the 'Blue Stone Printing Office' in Mercer Row.

This boulder is, doubtless, a natural monolith of glacial times; its surface, however, does not exhibit definite striæ. Unfortunately, its natural position is unknown, but considering its large size and great weight, the presumption is that it was originally found in the immediate neighbourhood of Louth.

After preparing and examining a large number of microscopical sections, we consider the stone to be a typical Dolerite. It consists of crystals of Plagioclase felspar (Labradorite); Augite, very fresh and in large crystals; Titaniferous Iron; a greenish-looking decomposition product (which may or may not represent former Olivine); and brownish stains, which are probably due to the oxidation of the iron. As the result of our examination did not exactly agree with the conclusions arrived at by one who had previously examined the stone, a section was submitted to Dr. Bonny, who says:—'The slide contains Plagioclase felspar, probably Labrodite; Augite; Iron Oxide (Ilmenite); and a greenish mineral of secondary origin, probably indicating the former presence of a ferro-magnesian-silicate. The replacing mineral is so indefinite in its character that I can hardly venture to give it a name. The structure of the rock is "Ophitic." It is merely a question whether we should call the rock a dolerite or a diabase. It is not a very typical diabase, but is a slightly altered dolerite. So

* Reprinted from *The Naturalist*, 1887, pp. 225-226, by special permission.

practically your determination is accurate. In Scotland there are many dolerites in this condition, where one man would call them dolerites and others diabases.'

Formerly standing at the corner of Mercer Row—the principal street in Louth—this boulder became a nuisance as a rendezvous for loafers and idlers, on which account it was removed, at a considerable expense, to the premises above-mentioned. These premises were in old time a large county inn, of which the 'Blue Stone' formed the material sign, and there is still in Louth a publichouse, known as the 'Blue Stone Inn,' which has a rough representation of the boulder for its sign; there is also a tradition to the effect that it was once in use as a Druidical altar stone on Julian Bower, a locality not far distant from its present position. Chapter xix of Bayley's 'Notitiæ Ludæ,' 1834, is devoted to the 'Blue Stone,' from which the following extract may perhaps be amusing:—'Conjecture is endless, and the positive opinions of men who have given some attention to the subject are very numerous and unsatisfactory. Some think a land flood, others an influx of the sea, others the Noachic flood [!] to have caused the presence of this stone here.'

HOW THE LAND BETWEEN GAINSBOROUGH AND LINCOLN WAS FORMED.

By F. M. BURTON, F.L.S., F.G.S. *

IN addressing you on a geological subject, as I am about to do, I do not forget that this is a Society of Naturalists; and as Geology, to those who have not studied it, may perhaps have an uninviting aspect, I intend to avoid technical details as far as possible, endeavouring at the same time to show that, in point of interest, Geology comes quite up to that of any other branch of natural science, and perhaps, I may say, exceeds most of them.

* An address, delivered at Grimsby, November 22nd, 1894, to the Lincolnshire Naturalists Union, by the second President (1894-5).

Geologists divide the earth's strata, for convenience, into 3 great divisions—Primary, Secondary, and Tertiary—and as, in Lincolnshire, we have representatives of the entire Secondary series, from the strata above the Trias on the west to the chalk on the east, this fact alone must give to the Geology of the County a special interest and value. I am not, however, going to speak of so wide an area now, but intend to confine my address to the low flat land between Gainsborough and Lincoln—a distance of some 15 miles—alluding to the adjoining strata, only as they are necessary to explain the structure and present configuration of the district.

Now, as we stand on the high ground above Gainsborough and look over the Trent, we are on the oldest strata in the County—the Upper Keuper beds as they are called—at the top of the Trias or new red sandstone, the highest beds in the great Primary Division; and if we could be carried back to the time when these beds were laid down, we should see, instead of the present country, a vast lake, or inland sea, surrounded on all sides by land, which extended far out into the Atlantic on the west, and was connected with Europe on the south, and with Scandinavia, over what is now the North Sea or German Ocean, on the east.

This region had, for a very long period, been in a quiet, tranquil state; a great contrast to the stormy Permian age which preceded it, when the Alleghany mountains of America and the Pennine Chain of Derbyshire, the backbone of England, were thrown up.

This vast inland sea was a fresh-water lake, which gradually became salt by the concentration of its waters,—like the salt lakes of North America,—and in which sandstones, grey and red marls, salt and gypsum were deposited.

It is to this inland sea, barren as it was, that we owe the rock-salt and brine springs of Worcestershire, Cheshire, and Middlesborough: while, from its deposits of gypsum, or hydrated sulphate of lime, we get ornamental alabaster and plaster of Paris, from which Parian and other cements are made.

In the railway cutting leading to Lincoln, bands of blue, red, and grey Keuper marls are seen, each resting on the other. They are the slow and quiet products of this great inland lake and have no traces of life left in them. Suddenly, however, a wonderful change takes place; for, resting on the uppermost

Keuper deposit, and at the same angle with it, appears a broad black band of rock, utterly different from the bed on which it lies.

The Keuper marls are, as I have said, devoid of fossil remains, but this new deposit abounds—nay, literally swarms—with them; while, instead of marly deposits, the new strata consist of fissile slaty shales, full of iron pyrites—the token of exuberant life—and narrow bands of sandstone glittering with mica: and, what adds to the wonder is, that, towards the base of this deposit, there lies a thin band of rock, not more than an inch in thickness, composed entirely of fish remains, bones, scales, teeth, and coprolites, pressed down into a hard solid mass; while a similar bed, scarcely as thick, occurs a little higher up. And how can all this have come about?

To understand it we must know something of the world we live on.

Originally a vast nebulous mass, which gradually condensed, it is now (as generally accepted) a thin crust, some 25 miles thick at the most, resting on a molten fluid substratum, under which (as some think), lies a solid rigid core. Now a thin crust over a fluid cannot be stable, and the surface therefore of our globe is for ever changing, rising here and sinking there; rising in parts where denudation makes it thinner, and sinking in regions where, through volcanic action or the pouring on of the débris of large rivers and other similar causes, matter is being piled up and the strata thickened.

And, in the region we are considering, action of this latter kind had taken place. The older strata had begun to sink, and, by degrees, the waters of a great ocean, coming up from the south over France, were let in upon them. The inland lake became an arm of the Liassic sea, and the Rhœtic beds were formed.

It must not be supposed, however, that all this took place suddenly. It was the result of no convulsion of nature, no rending of the rocks and inrush of the sea, but it came about quietly and imperceptibly, occupying as much time, probably, as would be necessary for so great a change in our own days. First, as the land continued to sink, would come the want of drainage, then the morass, then the tidal wash, and, last of all, the full open sea. It was the work of ages.

The Rhœtic beds,—which owe their name to the Alps of Lombardy (the ancient Rhœtia), the Grisons, and the Tyrol, where they attain a considerable thickness,—had not been

found further to the north in England, in 1866, than at Coptheath near Birmingham, and at Abbots Bromley in Staffordshire; when, in that year, as the gradients of the line between Gainsborough and Lincoln were lowered, I had the satisfaction of meeting with them. Since that time they have been discovered, in a nearly continuous line, across England from north to south, wherever the junction of the Trias and Lias is exposed.

Some geologists place these beds at the top of the Trias, others at the base of the Lias, or Jurassic, system. This, however, is a matter of small importance. They are the passage beds from one great system to another, from the deposits of the upper Keuper lake to those of the great Liassic sea; beds which go far to unlock the hidden story of the land we are considering.

About the origin of the bone beds referred to, much speculation has taken place.

Mr. Jukes Browne, in his work on "the building of the British Isles,"—to which I am indebted for several of the facts stated in my paper,—speaks of the irruption of the sea water being prejudicial to the inhabitants of the Triassic lake, "so that most of them died, and their bones, scales and teeth were drifted into layers on the sea floor;" but this, I think, could hardly have been the case, as, apparently, the concentrated saltness of the lake had, to a great extent, prevented the possibility of life—no trace of it, except in a few localities, being met with throughout the system;—and this view Mr. Jukes Brown himself bears out, when, in another part of his work, speaking of the Triassic lake, he says, "the sheet of water being apparently as salt, as clear, and heavy, and as nearly lifeless as the modern waters of the Dead Sea, or of the great salt lake of Utah." May not these beds be rather due to the fishes, which the Liassic sea brought in, being killed by the salinity of the waters of the inland lake? or, perhaps, after life had developed through the change of water, the land temporarily rose again, or became stationary for a time, and, the salinity returning, the fishes, no longer able to sustain life, perished, and their remains sank, in a layer, on the sea floor.

There is another fact of interest connected with the Rhœtics which must not be omitted before we leave them, and that is, that the earliest known British mammal—the Microlestes—a small insect-eating animal—is found within its strata. The Rhœtic beds contain also remains of the huge

Saurians which are so characteristic of the Lias and higher formations; and we are indebted to Mr. Montagu Browne, of the Leicester Museum, for an account of several new species, which he recorded at the recent meeting of the British Association at Oxford, as well as on two former occasions. Remains of Saurian life occur also in the Rhœtic strata at Lea, near Gainsborough.

AND now we pass on to the Lias, the lower beds of the Jurassic system, in which the ironstone bands of Frodingham and Appleby are found, and change to a deep sea; the remains of which, beginning a little way to the east of Gainsborough, extend right across to Lincoln, and form the material of the Cliff there to within 20 feet of its summit.

This sea is one of great interest; it covered a great part of England, with a portion of Ireland, and ran up far north into Scotland, having rivers to feed it from the adjoining lands around; while to the south it extended down towards the tropics. Its depth was considerable, and, as its strata show, its waters teemed with life. Fish, reptiles, molluscs of many kinds, echinoderms, insects, wood and corals are met with in its layers. The insects,—which, according to Westwood, belong to no less than 24 families, and comprise both wood-eating and herb-devouring beetles, grass-hoppers, dragon-flies, and may-flies,—together with the wood, were doubtless brought down by the rivers which flowed into the sea; while the corals owe their presence to the extension of its waters southward, enabling the products of warmer climes to push up towards the north.

Amongst the mollusca the Ammonites hold the first place. Chambered shells of great beauty, which have their counterpart in the Nautilus of the present day; they vary very much in shape, and are so distinct that they have been used to designate zones of life in describing the Liassic strata, each zone having its distinct Ammonite as a characteristic feature; and although this cannot altogether be relied on,—some Ammonites being found in more zones than one, and not always in the zones to which they give their name,—yet the fact of different species being found in succession one above the other, as the higher beds appear, bears strong testimony to the vast period of time that must have elapsed during the formation of these strata. We have only to call to mind how slowly forms of molluscan life, (and we may say the same of life generally), die out now, and are replaced by others, to appreciate this.

Taking an illustration near our own time, we find that, out of the shells in the Norwich Crag at the top of the Pliocene period in the Tertiary age, 85 per cent. exist at the present day; and yet, between that period and our own lies the whole of the Pleistocene and Glacial age, during which the Mammoth, the cave Bear and the Hyæna, the woolly Rhinoceros, the great Irish Elk and other animals appeared on the scene and passed away, hunted to death for the most part by man.

It is, however, in the Saurians that the great interest of this period centres. Huge fish-like lizards from 20 to 30 feet long —Icthyosaurs with eyes 14 inches in diameter, and Plesiosaurs with long swan-like necks—infested the shallower gulfs and bays, some swimming out in the open water and feeding on the fishes and Ammonites, others hiding themselves amongst the tangle and in the crevices of the rocks, and darting out at their passing prey,

> "Dragons of the prime
> That tare each other in their slime,"

while Pterodactyls—large, flying, bat-like lizards, which are principally found in the higher Jurassic strata—pursued their victims in the air, and clung to the cliffs and rocks on shore. A strange weird life indeed was that which once filled the plain between Gainsborough and Lincoln, and, with other deposits of the same period elsewhere, it has well been called "the great dragon land."

This wonderful development of Saurian life began in the Triassic age, attained its greatest energy in the Lias, and finally died out, as a dominating power, in the Chalk. The greater portion of it then passed, by the process of evolution, into birds; nearly every successive link in the chain having been now discovered, as Professor Huxley remarked at the late meeting of the British Association at Oxford.

And here, after ascending the Lincoln Cliff and passing over the higher beds of the Lias on our way—so well described by Mr. W. D. Carr, whose removal from Lincoln we all deplore as a real loss to our Society—we reach the Oolite capping at the top, and stand on ground made famous by many a stirring event in history. Here Cæsar's Roman legions came and colonized. Here Norman William reared his fortress against the vain force of Hereward, who lies with his true forsaken wife somewhere in Crowland's precincts amid the fens he kept so well. *We* from the same site look down,

immeasurably further back, over "the great dragon land," and picture again in thought the teeming life of the old Liassic sea.

AND now, having completed the building of the land between Gainsborough and Lincoln, I will, as briefly as possible, try to show how it attained its present shape.

To understand this we must first glance a little further to the east, where, after passing over the limestones and clays of the higher Jurassic seas, we reach the chalk wolds.

In these cretaceous strata we have the remains of beds which *must* have been laid down in great ocean depths, for there only are similar deposits being formed in our own day.

The Atlantic ooze, the modern equivalent of the chalk, is not deposited at a less depth than about 1,000 feet, and usually much deeper; and as this ooze is laid down, according to the *Challenger* calculations, at the rate of a foot in a century at the most, the chalk, which is now some 1,300 feet thick, and had at one time another 1,000 feet at the top of it, which has since been swept away, the time occupied in the formation of these chalk beds must have been enormous. At the above rate of a foot of sediment in a century, the lost 1,000 feet alone would have taken 100,000 years to form.

Now, that the neighbourhood of such an ocean as this, which reached from Ireland over Europe to the Crimea, should have greatly affected the area we are considering, is not to be wondered at.

For a long period, during the existence of the Oolite and higher Jurassic seas—when the land to the east of Lincoln, between it and the chalk wolds, was being formed—the Triassic, Rhœtic, and Lias beds on the west had become dry land; but as the chalk sea grew, the weight of its deposits caused the land all round to sink, and as this sea at last covered nearly the whole of England and Wales, the district between Gainsborough and Lincoln, with all the western land, was buried far beneath its waves.

Now the action of a sea is always that of a leveller, and as, in course of ages, the cretaceous ocean itself passed away, the land beneath it, as it rose again to the surface, presented a smooth plane of erosion, gradually sloping up to the higher lands around, which had, during this epoch, remained dry ground.

At this time—a period when the Pyrenees were thrown up—England, Scotland, and Ireland were probably, as Mr. Jukes Browne tells us, bound together in one mass. Land lay far

out into the Atlantic on the west, and land connected Scotland with Greenland through the Faroes and Iceland on the north, and with Scandinavia on the east.

How far, and to what extent, the area between Gainsborough and Lincoln was denuded during this great erosion, we shall never know; but as it rose higher and higher above the waves the carving tools of nature were brought into play, and rain, frost, and other forces of the atmosphere began their ceaseless work.

Now rain may seem but a weak agent for forming hills and scooping out valleys, but, with the help of frost and the corroding forces of the atmosphere, without doubt it effects the task.

Both hill and valley have one common origin; they are the remains of surfaces once planed and levelled by the sea, (I am not here speaking of volcanic force), which, when raised above the waves, were carved and cut into shape by the rain; the harder parts, the most capable of resisting erosion, forming the hills, and the softer portions, the most easily denuded, forming the valleys.

Rising as vapour, mist, and cloud, and falling again on the earth, rain is the source of all our lakes, springs, and rivers; and, through rivers, the source of continents also, by the deposition of sediment on the floors of oceans and seas, and by the silting up of shallow bays and estuaries.

Its work never ceases, and, aided by frost and the chemical components of the air, it penetrates and dissolves the hardest rocks, and nothing is free from its action. Rivers can cut only narrow channels, and it is left to rain to widen them into valleys. No drop of rain runs an inch on the surface without setting some soil in motion towards a lower level.

The amount of erosion depends, of course, greatly on the soil on which the rain falls. On clays, like those of the Lias, it works far greater havoc than on sandy or gravelly soils; though, without due thought, the reverse might appear to be the case. Mr. W. Whitaker of the Geological survey, in discussing the age of man at the recent British Association Meeting, well observed this when he said, "When rain falls on gravel and sand, which are open and porous, they say 'Oh! come in, there's plenty of room,' and in it goes and comes out again as a clear spring of water at the base; whereas, when it falls on clays and stiff soils, they say 'We don't want you and we won't have you,' and the rain, in response, washes hundreds

of tons away from the surface," showing that resistance is not always the best policy.

A good illustration of this may be seen in the district I am speaking of, for Hardwick Hill, which stands out as a landmark at the far end of Scotton Common, is mainly composed of gravel and sand, while the unyielding clays of the Lias are worn away to their present depth below the Lincoln Cliff.

For actions such as I have described unlimited time is, I need not say, required; but, that given, from the planed down surface of land emerging from the sea, we get the earth in its present form, with its infinite variety of mountain and valley, hill and dale.

Of course there are volcanic and other forces that aid in the construction of the earth's surface, but they lack the universality and ceaseless operation of rain, and there is no time to speak of them now.

It is to the eroding action of rain that we owe, in the main, the present features of "the great dragon land."

ONE more phase in the life history of the area we are considering I have still to record.

After the chalk sea had disappeared, and the Tertiary age—which may be called the latter days of geology—had set in, the land underwent, for a great length of time, varying periods of elevation, subsidence, and rest, during which the North Sea appeared, and the principal physical features of our islands were developed; but in the later Pleistocene epoch—a period approaching our own days in a geological sense—a great change took place. The Glacial conditions, which now prevail in the arctic regions, gradually invaded our land. The whole country sank to a considerable depth below its present level, and a great portion of Lincolnshire was covered with floating ice, which scored the rocks, and poured on its surface volumes of mud and clay, mixed with stones and boulders, which now pave the streets and market places of Gainsborough and Lincoln. And when, at last, all this had passed away, and the land had risen again to the surface, a period of subsidence once more set in. The North Sea, which had come into existence prior to the invasion of the ice, but had, during this period, been filled up with its débris, again resumed its sway. Our land, in course of time, became separated from the Continent, and Great Britain, as it now is, appeared.

I should like to have spoken of a great river system, which cut through the Oolite and Lias on the south and west, and

poured its waters into the Wash,—a system, the only remains of which are seen in the Lincoln Gap, through which the Trent once flowed, and where the Witham still finds its way,—but time will not permit of it.

I have drawn attention to the vast period of time that must have been consumed during the events I have attempted to describe; and this is a point that I cannot too strongly impress on your memory.

I have dwelt on the structure and configuration of the land, as it appeared during the several ages my paper deals with; for this is the goal that all geological investigation should aim at. The special study of strata, and their embedded relics, valuable as it is, is nothing, if, out of it, we do not try to build up the framework of the world, as it appeared at the time these strata were deposited. I do not mean in any sense to underestimate the value of such special studies. Those who labour at them are the patient seekers after facts, without whose labours it would be impossible to read the story the rocks are meant to teach. And here I must bring my paper to a close.

Elevations and subsidences are still going on, though we cannot see them. Attrition and denudation of the strata are still proceeding, though, in our short existence, we cannot trace them. Rains, frost, and rivers are still at work. The "dragon land" is slowly altering year by year; and the carving and modelling of the surface will last, as long as raindrops fall, and a vestige of land remains above the waves.

LINCOLNSHIRE NATURALISTS AT LOUTH.

By R. W. GOULDING,
Mercer Row, Louth.

[Reprinted from the *Louth Advertiser*, 1894.]

THE Louth Antiquarian and Naturalists' Society joined the Lincolnshire Naturalists' Union at their fifth meeting on Monday last. Arrangements had been made for a fungus foray in Muckton, Burwell, and Haugham Woods, permission to visit which had been courteously granted by Porter Wilson, Esq., and Wm. Hornsby, Esq., notwithstanding the fact that the day chosen for the excursion was the 1st of October, when pheasant shooting begins.

It was hoped that some of the visitors would form a party for the investigation of the geology of Donington and district, and this section was represented by Mr. F. M. Burton, F.L.S., F.G.S., President of the Union, Mr. Jos. Mawer, Mr. O. Burdett and Miss Burdett, who, under the leadership of Mr. S. Cresswell, proceeded to Donington, thence in a westerly direction towards South Willingham and back by Benniworth Haven to the east end of Benniworth Tunnel, examining the railway cuttings on the way. At Stenigot they diverged and made for Goulceby Top, and then crossing the Heath Road reached the east end of Withcall Tunnel, afterwards turning towards Louth, and passing Raithby Brackens and Hubbard's Valley. The party observed the marine equivalents of the Weald and southern beds, and found good sections of the red chalk, (a member of the Gault), the carstone, the pink chalk, (near Louth), and other strata.

The fungus section was strongly represented, among the party being some of the most eminent mycologists in the country, the principal being Mr. George Massee, of the Royal Herbarium, Kew, author of the *British Fungus-Flora*, and Mr. Carleton Rea, M.A., B.C.L., Worcester. Other able men were Mr. H. T. Soppitt and Mr. Charles Crossland of Halifax. The local members metaphorically sat at the feet of these Gamaliels, whose excellent services they highly appreciated. Others who joined the section were Mr. J. W. Sutcliffe of Halifax, Mr. Sneath and Mr. Fieldsend of Lincoln, Mr. B. Brow, Mr. T. Gelsthorp, Mr. G. Vere, Mr. V. T. Crow, and Mr. R. W. Goulding of Louth, and Mr. Walter F. Baker, F.E.S., the indefatigable secretary of the Union.

Some of the excursionists reached Louth on Saturday and worked Hubbard's Valley, Welton Vale, and the neighbourhood of Elkington before the official proceedings commenced. They found the lawn in front of Elkington Hall a very productive spot, their best record being the very rare *Psilocybe pilulæforme*. Other species of interest were *Hygrophorus foetens H. glutinifer*, *Tricholoma saponaceum* (which emits a soapy odour) and *T. personatum*, an edible species, well known by its popular name "Blewitts." On the leaves of some poppies they noticed a disease, *Peronospora*, which is allied to the potato disease.

On Monday morning the party left Louth station at 10.12, booking for Authorpe, whence they proceeded through Muckton, Burwell and Haugham Woods, returning by drag from Cawthorpe Lane. Early in the day a specimen of grass

affected by the blight *Ergot* was found. This ergot results from the growth of a fungus (*Claviceps purpurea*), known for its medicinal and other properties. It converts the ovary of the grain (particularly rye) into an elongated cylindrical excrescence resembling a horn or spur, which is first red, then lead-coloured and finally black with a white interior. A writer on fungi states that where rye is extensively cultivated, grains diseased in this way often compose a considerable part of the bread produced, and thus not infrequently give rise to ergotism, one of the most distressing diseases to which the human frame is liable, and "on the Continent," says Johnston, "rye gangrene of the limbs, induced by eating bread made from the ergotised grain, has proved fatal." It is highly important that farmers should carefully pick out any ergoted grains he may perceive, for, if neglected, they may result in very serious mischief.

The records of the day were numerous, about 120 species in all, many of them being known by polysyllabic Latin names, which to the uninitiated did not appear to fulfil the conditions of Mr. Weller's definition of "a wery good name and a easy one to spell." Very few species have English names. We were, however, introduced to the "Liberty Cap," though we were told that in all probability we should not survive to tell the tale if we were rash enough to eat the little conical *Agaricus* which popularly goes by that name. We were of opinion, moreover, that we could more easily remember "Candle-snuff fungus" than *Xylaria hypoxylon*, which we were informed is the proper designation of the little fungus which closely resembles the burnt wick of a candle. "Come eat us" sounds an excellently appropriate name for a delicious fungus whose acquaintance we rejoiced to make, and we congratulate the people of Huddersfield who have substituted this name for *Coprinus comatus*. One other English name we heard, and that was the "Vegetable Beefsteak," a term which exactly describes the appearance of *Fistulina hepatica*. This fine fungus grows in England only on oak trees. Canon du Port (of Denver), who joined the party at tea, said that it was very good eating, and he gave some directions for cooking it properly.

Of edible species some 30 were found, some of them being of great interest. For instance, *Coprinus atramentarius*, described by the experts as a delicacy, and as *the* mushroom *par excellence* for ketchup making, is of a dark, inky colour, and a durable ink was formerly made from it. *Hygrophorus psittacinus* is noted for its beautiful green and yellow hue.

Clavaria fusiformis and *C. fragilis* bear a cluster of yellow fruit shaped like long clubs, and the snowy *Hygrophorus niveus* is as delicate as it is said to be dainty.

Turning to inedible fungi, the best find was considered to be *Psilocybe pilulæforme* (which had also been obtained at Elkington). Another good record was the local *Chlorosplenium æruginosum*. This small fungus is a rich green in point of colour, and its mycelium (or spawn), which is of the same hue, gives a green stain to wood, and wood so stained was formerly used for Tunbridge ware. The large yellow *Pholiota spectabilis* was conspicuous. *Clitocybe fragrans* has a pleasant spicy odour, and *Russula nigricans* turns black when mature. *Xylaria polymorpha* is dead black in colour and is surprisingly heavy. The genus *Lactarius* (which emits when squeezed a milky-looking fluid) was represented by various species, many of them being extremely plentiful, *e.g.*, *L. quietus* (the liquid of which has an oily smell), *L. vellerius* (which assumes a cup-shape when mature), *L. pyrogalus* (the milk of which is very acrid), and *L. pubescens*. One of the most abundant kinds was *Armillaria mellea*, so called because it is honey-coloured. On the whole the district is fairly good and appears to be particularly productive of microscopic forms.

The botanists in search of flowering plants had but a small record. The early part of October is not a favourable time for collectors of phanerogams, and hence very few specimens were discovered. We may, however, mention the hedge Stone-wort (*Sison amomum*), the Dwarf-spurge (*Euphorbia exigua*), the Musk Mallow (*Malva moschata*), the Hoary Ragwort (*Senecio erucifolia*), and the Skull-cap (*Scutellaria galericulata*), which was in abundance in Haugham Wood.

A meat tea was provided at the "King's Head" at 5.15, and the party then received several additions, among them being Mr. C. M. Nesbitt (President of the Louth Society), Mr. Joseph Larder and Mr. J. B. Robinson. After tea sectional and business meetings were held. The accounts were passed; the thanks of the Union were voted to Mr. Wilson and Mr. Hornsby; Mr. Fieldsend was elected assistant secretary in the place of Mr. Coe; it was decided that the annual meeting of the Union should be held at Grimsby on the 22nd of November; a sum of £3 3s. was voted to the Rev. E. Adrian Woodruffe-Peacock in aid of the purchase of cases for the plants which he has collected for the county herbarium; and it was announced by the President that it was

probable that rooms in the Old Prison in the Castle Grounds at Lincoln would be set apart for a county museum. It was also resolved that the transactions of the Union should be published.

After the meeting the fungi were named and were exhibited at the Committee Room of the Mechanics' Institution, and at 9.15 Mr. Massee delivered a lecture, taking Fungi as his subject, and drawing particular attention to many of the specimens on the table. He treated his theme from the evolutionary standpoint, indicating broadly the relative development of different types. His first illustration was the flat *stereum* which lies along the soil or rotten log, and is simply a fruit mass. He pointed out that what is popularly understood to be the fungus is in reality its fruit, which fruit bears a similar relation to the mycelium that an apple bears to the tree on which it grows. Mycelium is the technical word for the spawn or vegetative and productive part of the fungus which creeps underground or under bark and creates the material of which the fruit is the visible sign. He then described *Clavaria*, *Craterellus* and other well-defined and more highly specialised forms. Referring to edible species, he said he did not believe in any of the old rule of thumb methods of discrimination. Edible fungi had distinct characteristics and these characteristics had to be learned. He suggested that anyone who was desirous of pursuing the study should obtain Dr. M. C. Cooke's excellent book on *Edible Fungi*. He proceeded to state that there were two groups of poisonous forms, the alkaloids and toxalbumins. When the albumen is coagulated, then these latter forms are innoxious and may be eaten with safety. Many of the so-called poisoning cases were in his opinion not due to the actual poison of the fungus, but might very probably be attributed to the fact that the fungus had been eaten to excess. In some cases it was dangerous to drink spirituous liquors after a meal of fungi, for it happens that some of the poisons are not soluble in water, whereas they are in spirit. Thus one man may eat certain kinds of fungi and not take the slightest harm, whereas another man may eat out of the same dish and then may have a couple of glasses of whisky, the result being that the poison would be liberated by the action of the spirit and would perhaps prove fatal. Cases of this sort are well known.

Mr. Massee was cordially thanked for his lecture on the motion of Mr. Burton, seconded by Mr. B. Crow. In acknowledging the vote, the lecturer said he hoped that one of

the results of his talk would be that those present would at least refrain from injuring toadstools when they saw them. He ventured to make that suggestion because he knew that many Englishmen appeared to consider it their duty to go out of their way to kick over toadstools, and felt an inward satisfaction when they had done so.

On Tuesday, Canon Du Port, Mr. Massee, Mr. Rea, Mr. Jos. Larder, Mr. J. B. Robinson and Mr. T. H. Burditt explored Acthorpe and adjoining woods and were well satisfied with their discoveries. The first wood examined was the larch plantation at Fotherby, and this proved the best of those visited, the fungus flora being totally distinct from that seen on Monday. The specimens, however, were of too critical a character to enable a decision to be given on the spot. Among those found were *Spathularia flavida*, *Hygrophorus psittacinus*, *Stropharia æruginosa*, which has a very pretty bluish colour, *Lactarius blennius* and *Tricholoma rutilans*. Among ferns were noticed *Nephrodium dilatatum* and *N. Filix-mas*, specimens of the latter being very generally sterile.

A LINCOLNSHIRE COLEOPTERA RECORD WANTED.

By Rev. A. THORNLEY, M.A., F.L.S., F.E.S.,
South Leverton, Lincoln.

MY object in this short paper is to induce Lincolnshire people to assist us in making complete the Natural History record for the county. I believe a great many would help if they only knew how. They think that a great deal of time and a great deal of knowledge is necessary before they can do anything useful towards this object. This is indeed not so. All that we would ask for is the collection of material. There are many friends, specialists in particular departments, always ready to work it out. In this paper I plead especially on behalf of the Coleoptera or Beetles, not that I consider these as surpassing in interest any of the other productions of nature, but I hope by means of them to illustrate how much interesting and useful work may be done. It will be necessary to point out at once that for our purpose

the record is more important than the specimen, as the object of this inquiry is not to accumulate a handsome collection of insects so much as to study the distribution, variation and life habits of each species. Beginning with locality we work to the county, from this to the country and so on until the gathered results give us full information as to the distribution and variation of the species in the world. I will venture to say that no more absorbing problems come within the view of the naturalist than those connected with the range and variation of species. When many records are possible it is not an uncommon thing to discover that species usually considered common are much more local than was expected, and that so-called rarieties are much more generally distributed than was known. Then again the study of habit and life history is a great deal more profitable than the mere amassing of specimens for show. So much then for the general objects which the true naturalist will keep in view. I might spend a much longer time dwelling on the pure delight of such an investigation, its interest and exhilaration—the best tonic and stimulant to health and spirits possible. Think of the profusion of living things around us. The other afternoon one dip of the water net brought up an amazing number of bugs, amongst which were no less than five species of *Corixa;* and out of this same little village pond, a very ordinary one, I have taken fifteen species of water-beetle. As I am not writing for experts, a few words as to ways and means may be useful to some. Natural ingenuity will suggest a great many more than are mentioned here. Let our friends then provide themselves with a small bottle—the rounder the better—well corked. Through the cork insert a large quill, with a little plug to close the outside end of it. Through the quill he drops in tiny insects from the palm of the hand. He should put inside a little blotting paper or crushed laurel leaf. An old umbrella, a good strong water net, a large white canvas sweeping net and a few small strong glass tubes to go in his waistcoat pocket—these will rig out our friend with almost all he wants. His operations may be briefly summed up under six heads—all quite obvious: (i) turn over all decent sized stones; (ii) beat into umbrella trees and shrubs; (iii) sweep herbage with the bag net; (iv) fish streams and ponds (particularly close to the banks) with the water net; (v) shake out moss and litter of every kind over paper; (vi) cut up old bark and rotten tree stumps with an old knife. A few words as to killing insects

may be useful. Laurel leaf will kill many, but a nice cyanide bottle may be made by filling a large-mouthed bottle for a quarter of its depth with plaister of Paris, moist, and before it sets insert a few pieces of cyanide. When it is hard and dry, a piece of blotting paper may be cut to the required shape and put on the top of the plaister. Keep well corked and you will have no more useful instrument in your collection. Beetles and all hard insects may be well killed by putting them for a few seconds into *absolutely boiling* water, which kills *instantaneously*. But above all do not forget to make a proper record of date and place of capture—this is imperative; any other data you like to add, *e.g.*, meteorological conditions, food plant, peculiar habits, will be very valuable. It only remains to say that Lincolnshire with its varied conditions of soil and level, with its sea board and varied climate, should be a very good county indeed for entomology. The few localities in which I have worked have invariably yielded good results. I need hardly say that I shall be glad at any time to name and report upon beetles, and possibly other insects; and I am quite sure that I can add that any of the various sectional secretaries of the Lincolnshire Naturalists' Union will be glad to do the same. The insects can be sent in quills or glass tubes in small boxes easily through post, the return postage being sent with them if they are to be returned. A report upon them will then be sent to the sender at the first opportunity.

A SHORT ACCOUNT OF A COUNTRY PARISH;

With some notes relative to the effects of game preserving on its Natural History.

By Mrs. C. E. JARVIS.

PART I.

THE parish of Hatton contains 1831 acres, of which about 270 are woods. It belongs entirely to one owner, who rears from 1000 to 2000 pheasants annually. In the adjoining parishes game is also preserved, so that the effect on animal life is about equal for some miles round. The soil is mostly stiff clay but part is sand.

And first as to the inhabitants—157 in number according to the last census. The houses number 36, of which five may be described as farm houses. The largest farm contains between 300 and 400 acres, the others less than 200 each. There are two other small holdings and the blacksmith and carpenter each farm a few acres. A wheelwright and a shoemaker represent other trades. There is a small general shop and a brickyard, and everyone has a garden; there is also one public house. The Lincolnshire custom of hiring garthmen, shepherds, waggoners and labourers by the year, "confined men" as they are called, causes a constant change among them, so that though the farms seldom change hands, only half the inhabitants can be considered as constant residents. The good old Lincolnshire dialect, with many words of Danish origin, is still spoken, and though it may become extinct in course of time through the compulsory Education Act, it will not be so soon as some people think. As long as children can contrive to pass the 4th Standard and go to work at 12 years old they soon forget most of what they learn at school and revert to the expressive language of their parents. A farmer who was asked his opinion of technical education said, the most useful thing a boy could learn was to hold a gate open for a flock of sheep to go through whilst they were being counted.

The following are some of the words still in use:—*Bottle*, a bundle of hay or straw; *fell*, ferocious; *fierce*, lively; *flea*, fly; *gain*, near—"Gain of a road"; *odd*, solitary—"An odd house"; *low*, short—"A low woman"; *thack*, thatch; *t'year*, this year; *wankle*, weakly.

There is no actual village, most of the houses being scattered in pairs about the farms, but that part of the parish nearest the church is called the "Town": there is the "Town-end close"; and, till lately, the "Town-end gate" lead into some unenclosed fields, now fenced off. Twenty-five years ago, the Rectory and most, if not all, of the cottages were of "stud and mud," with a large open chimney. One only remains as it was, the rest have been replaced by commodious but ugly brick and slated tenements, or altogether altered and roofed with tiles. The old Rectory was demolished in 1870, and the architect judged by the chamfered oak beams that it was 500 years old. Until 1874 the nearest station was seven miles distant, and many people had never been in a train, much less seen the sea; a visit to the market town on foot or by carrier

was all the outing they aspired to: now there is a station at half the distance, and they travel more, occasionally going by an excursion train to the seaside.

Bank Holidays pass almost unnoticed, but May 14th, or Pag-rag day, is a great event, when the single farm servants, male and female, leave their places, or at least take a week's holiday, and spend the time in visiting their friends and going round to the different markets. The married men decide whether they will remain with their masters at Candlemas; they have the privilege of attending what is called the labourers' market soon after that date, when they hire themselves again and leave their old places April 6th. The life of an agricultural labourer has the advantage of being healthy; they are seldom ill and often live to a great age; their work, if on a day farm, is heavy, but it is slow—they need not hurry except in harvest time; their food consists of bacon, bread, potatoes and other vegetables,—butcher's meat once a week if they can afford it,—with tea and sometimes beer; milk is not always obtainable, and they use butter sparingly. The lads who board with the foreman have plenty of bread and milk and bacon every day, tea or coffee on Sundays. On the other hand their hours are long: in summer from three or four o'clock till nearly dark, and the married men have no holiday except at their own expense; no wonder all the sharpest boys want to be clerks or go on the railway, where they have some time to themselves, at least on Sundays. If farmers would give each man a week's holiday, and a day off occasionally to work in his garden or go to a neighbouring fair or flower show, he would be much more content. Some arrangement should also be made to give the garthmen and shepherds assistance on Sunday; they like to have the chance of putting on their best clothes, which they seldom do except to attend a funeral.

The Reading-room at Hatton is self-supporting, and, for so small and scattered a parish, much appreciated in winter, besides being useful for meetings, teas, etc., at other times. The married labourers do not patronize it, because they naturally prefer their own firesides when once they get home; but it is a pity the lads are not encouraged to make more use of it, instead of spending their evenings in stables and outhouses.

ANIMALS.

About 20 years ago the old keeper was pensioned, and his nephew, an intelligent young man, took his place. Till then

scarcely any game was reared and foxes were plentiful. Several foxhound puppies were "walked" by the farmers, whose wives complained, not only of the quantity of bread and milk they consumed but of the devastations caused by the foxes amongst their poultry even in broad daylight, whilst those people living near the coverts could hear them barking at night and see the cubs playing about in the early morning. In winter, the hounds in full cry afforded frequent excitement for the labourers and school children.

All this is changed: the foxhound puppies have long since vanished, as have the foxes, with the exception of a few outsiders attracted by the game; they are not encouraged to stay and breed.

The present keeper has given me some interesting information about some of the quadrupeds and birds, which I will transcribe in his own words. He says: "I have never seen or heard of a badger at Hatton. I trapped a marten in Hatton Wood about 15 years ago; I have never heard of another one at Hatton since that time. We had a polecat here some four or five years ago; it was caught in the rabbit traps at Panton shortly after we had seen it. I know of four kinds of mice—the two kinds that live in the fields, the indoor mouse, and the dormouse. One of the field mice is reddish, with a long tail and a dark bright eye (*Mus sylvatica*). The other one is a dark mouse, what we call the grass mouse; you may see plenty of them in the summer in the hay field; I do not remember seeing one of them at any other time of the year; they have a short face and rather large head, with a short tail; colour very much the same as the house mouse; it is much bigger and heavier looking than any of the others (*Arvicola pratansis*). The dormouse I have seen twice; once in Chamber's Wood when shooting, two of them were picked up together in a sleeping condition; if I remember right they were found in a nest of dead leaves; the other I saw in Hatton Wood. We have had a lot of stoats this summer (1891)."

In February, 1890, I saw a white stoat with a black tail run from under some large trees across a field to a sunk fence in the middle of the day. There was always a pair of bats about the ivy-covered Rectory, probably *Vesperugo pipistullus*; they were to be seen at dark from March to November, and occasionally in winter in very mild weather.

The hedgehog is not yet quite extinct, though the keepers trap and otherwise slay a few every year. I once had the

pleasure of letting one out of a trap; it was caught by the hind leg, and ran off not much the worse. The hedgehog's little grunt as it runs along a dry ditch in an evening is one of the pleasantest summer sounds.

The shrew is common, and dead ones are frequently seen, perhaps, as suggested by Mr. J. E. Taylor in *Underground*, carried off by an epidemic caused by want of food.

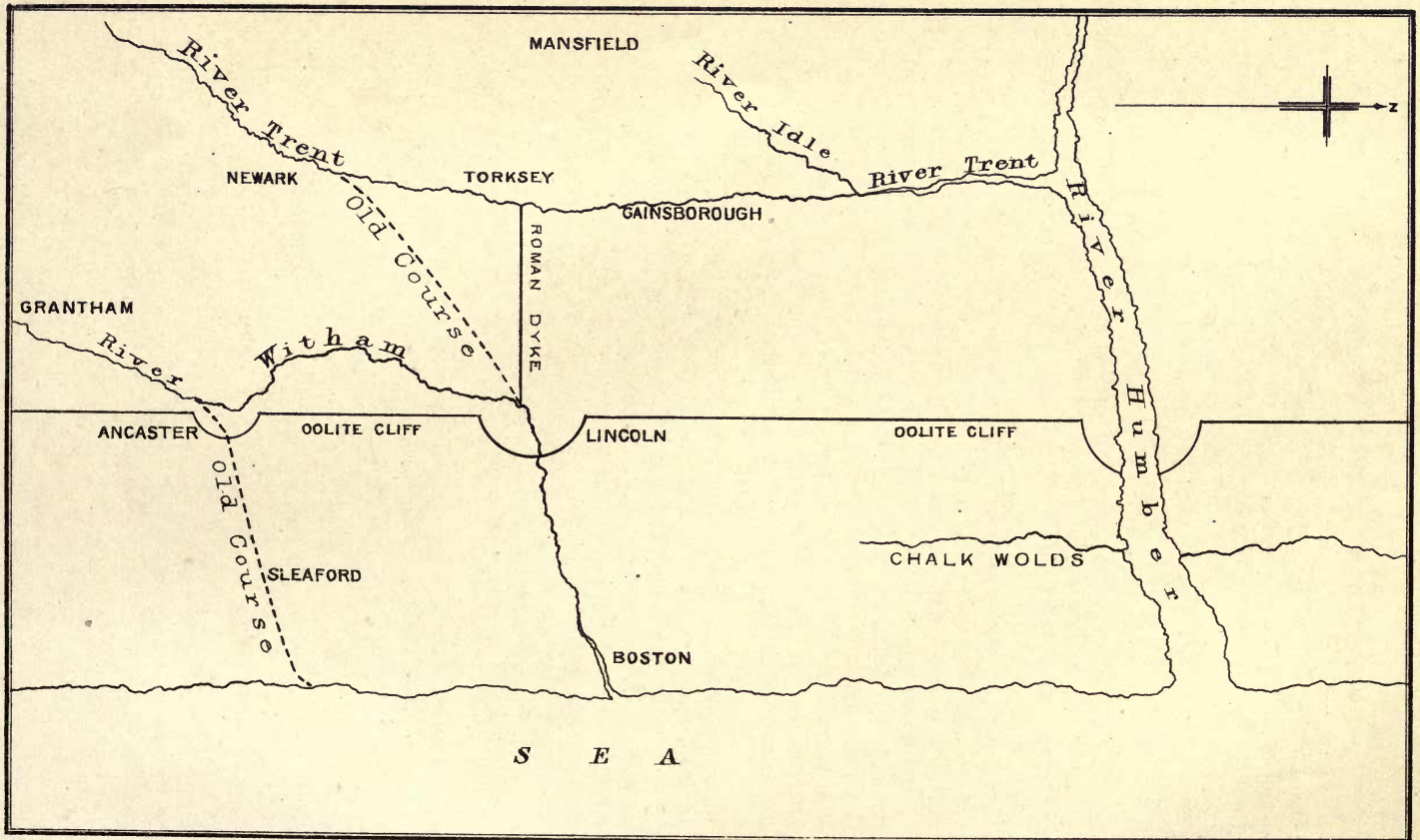
The mole is plentiful in the lighter land, it does not work so much in clay; formerly a mole-catcher (as well as a rat-catcher) was appointed every year by the Vestry, but both offices are now abolished.

The squirrel is another victim to game preserving; it is shot at whenever seen, its chief crime being that it nibbles off the lead of the spruces. An odd one or two found an asylum about the Rectory grounds, where stood the only beech tree of any size in the parish, which no doubt attracted the squirrels in the autumn. I once, to my surprise, watched a squirrel eating a fungus, which it held in its paw and nibbled as if it were a biscuit. The fact was new to me, but on making enquiry in the *Naturalist* and elsewhere, I found it was not unknown.

Rats are among the animals which profit by the preservation of game. An M.F.H. once told me a fox enjoys nothing more than a fine fat rat, which shows that Reynard is of some use besides affording sport. The extermination of hawks, owls, magpies, and jays is also accountable for the great increase in the number of rats. In autumn and winter when the becks and ditches are full of water, they betake themselves to farmyards and stick heaps, and though the farmers may kill hundreds when threshing, it does not seem to diminish their numbers.

The water vole is a harmless animal and allowed to live in peace by the side of the beck. I have watched a pair of them from a bridge, sitting on the water plants and nibbling away at their evening meal, either unaware or oblivious of my presence.

We now come to those highly-favoured races, hares and rabbits, which next to pheasants and partridges are most thought of. Their numbers vary according as the season is wet or dry. As many as sixty hares are sometimes shot in a day, and very fine ones they are, weighing 10 or 12 pounds. Twenty hares have been counted in one large field of white clover in winter; but though farmers complain of having to feed so many, they do not cause so much havoc as rabbits,



F.S.Weller.

DIAGRAM ILLUSTRATING "THE STORY OF THE LINCOLN GAP."

because they are spread more evenly over the country, whilst rabbits keep to one side of a wood or hedge, and eat the corn crops till they look as if they had been mown for a certain distance, besides which they waste so much, never picking up again what they have once let fall. According to the keepers, rabbits are quite scarce at Hatton, and it is true they do not multiply so quickly on clay as on sandy land, but they are carefully preserved as food for any stray fox, and to be mixed with pheasant food when boiled. Now and then a day is given to rabbit shooting, when between 300 and 400 are shot, so they can hardly be considered scarce. A few black ones exist and are generally spared.

List of mammals:—Bat (*Vesperugo pipistrellus*), hedgehog, (*Erinaceus Europæus*), shrew (*Sorex tetragonarus*), mole (*Talpa Europæa*), marten (*Martes foina*), stoat (*Mustela erminea*), polecat (*Mustela putorius*), fox (*Canes vulpes*), squirrel (*Sciurus vulgaris*), rat (*Mus decumanus*), field mouse (*Mus sylvatica*), house mouse (*Mus musculus*), grass mouse (*Arvicola agrestis*), water rat (*Arvicola amphibia*), hare (*Lepus Europæus*), rabbit (*Lepus cuniculus*), dormouse (*Myoxus avellanarius*).

Reptiles are represented by the slow-worm (*Anguis fragilis*), the grass snake (*Tropidonotus natrix*), two sorts of newts, and I once saw a lizard. The frog (*Rana Temporaria*) is common in and near certain ponds, and the toad (*Bup vulgaris*) about gardens.

THE STORY OF THE LINCOLN GAP.*

By F. M. BURTON, F.L.S., F.G.S.,

President of the Lincolnshire Naturalists' Union, being the Presidential Address, delivered at Lincoln, 1895.

PART I.

A TRAVELLER starting from the Trent side, and journeying eastwards across Lincolnshire, might reasonably suppose, as he met with escarpment after escarpment—first the Triassic and Rhœtic, then the Oolitic, and lastly that of the Chalk, with, here and there, lesser intermediate ridges

* Re-published, with alterations and additions, from *The Naturalist*, 1895, pp. 273–280, by special permission.

—that the sea had been at work in forming the surface of the land; but his impression would be wrong. True that, since the land rose from under the deep chalk ocean, it has undergone various periods of subsidence, elevation, and rest, and has been covered by the waters of the sea at various times; true that, in the ice period, the whole of the land sank to a considerable depth below its present level, and, therefore, true that the surface has been to some extent modified by the sea—yet, for all that, there are distinct proofs, both positive and negative, that it is to the action of rain and rivers that the present configuration of the land is due.

In order to understand this, we cannot do better than consider how the gap through the Oolite escarpment at Lincoln was formed, as from it we get a clue to all the rest.

In my address last year I alluded to a great river system coming from the South and West, the only remains of it being the Witham.

Rivers cut narrow gorges or channels, and it is left to rains and sub-aerial forces to widen them into valleys. The fiords of Norway and the cañons of America are the work of rivers; but no one will give the Witham the credit of having cut through the Lincoln Gap, so we must look for a more powerful and efficient agent, and we find it in the Trent.

In considering this, it is most important that we should bear in mind the difference in the height of the land before the gap was formed, and at the present time.

To enable a river to cut through rocks, whether hard or soft, it must, of necessity, start from higher ground than the land it runs over; it must in fact have a downward slope to work on, and cannot go uphill. The land, therefore, to the West of Lincoln must at one time have been higher, instead of lower, than the present cliff, otherwise the gap could not have been made; or, as Mr. Jukes-Brown, in his paper "On the relative ages of certain river-valleys in Lincolnshire," puts it: "The original direction of all rivers which cut through ridges was determined by the general slope of the ancient surface over which they began to run." This being borne in mind, what evidence is there to show that the Trent once flowed through the gap on which Lincoln is built?

The river itself is one of considerable volume. It is the combined issue of several streams, having their sources in Derbyshire, Staffordshire, Warwickshire, and Leicestershire, and it flows, as far as Newark, in a north-easterly direction;

there, however, it leaves its course and bends to the north, skirting the low Triassic and Rhœtic escarpment on the west, "as if it had not been able to cross that comparatively slight obstruction"; then, continuing past Gainsborough, it flows on northwards until it is lost in the Humber.

Now that this northward bend of the Trent, after reaching Newark, is of comparatively recent origin, and that it formerly continued its north-easterly course, and flowed through the gap at Lincoln, is capable of proof; and the credit of suggesting this is due to Mr. Penning, of the Geological Survey, when he was engaged, in 1878, in mapping the gravel beds round Lincoln.

And what are the proofs? First, it is, as Mr. Jukes-Browne says in his paper before referred to, "a significant fact that if the general course of the Trent, south-west of Newark, be prolonged to the north-east, it points to the great gap in the Oolitic escarpment at Lincoln through which the river Witham now flows"; but it is more significant to find that, all along this north-east track, lie vast beds of ancient gravel deposits, showing clear traces of river action, distinct from the other and more modern gravels around (which latter, as I shall show later on, are the result of floods to which the Trent has always been greatly liable); and still more significant is the fact that these ancient gravel beds carry with them incontestable proofs of their origin, being "largely made up of rounded pebbles of quartzite, hornstone, and other old rocks, which have evidently been derived from the triassic pebble-beds beyond Newark on the west"; and as these ancient gravels, with their component pebbles, are found in large quantities, not only between Newark and Lincoln to the west of the gap, but right through and far beyond it, on the east, they could have been brought there only by the Trent, otherwise there is no way of accounting for them.

All this is, I submit, sufficient to convince any reasonable mind that the present course of the river Trent is not its original one, but that, ages ago, in early pre-glacial times—(as I think), and not post-glacial, as Mr. Jukes-Browne suggests—it passed through the Lincoln Gap to the fen-land beyond, which was then probably an open bay.

My reason for putting the date back to pre-glacial times is that the submergence of the land in the eastern part of England, during that age, was not sufficient to wear away its then existing contour to any great extent; and the denudation

of the Keuper strata, where the Trent now flows, weak as these strata are, must have consumed a very long period of time.

We have now to enquire how the change came about; and, to understand it, we must learn something of the laws relating to river courses.

Rivers may be roughly divided into two main classes, "primary" and "secondary." The "primary"—or, as they are sometimes called, *transverse* rivers, from their running with the dip, transverse to the strike of the beds—take their rise on any elevated ground, and, having a gradual slope towards the sea, cut in a more or less direct line through hard ridges and soft strata alike; and the valleys they form in their course, with the aid of rain and atmospheric agencies, are known as *transverse* valleys; while the streams which flow into them on the sides, and which follow the strike of the strata, cutting through the softer and weaker beds between the ridges, are known as "secondary" or *subsequent* rivers, and their valleys *longitudinal.* These "subsequent" streams may be, and they sometimes are, of greater length than the "primary" rivers; and, as they deepen their beds and widen their valleys, they leave the hard ridges, parallel to which they run, standing out as inland cliffs or escarpments (the formation of "longitudinal" valleys, and of inland escarpments, being, in fact, in each case the result of one and the same process). Again, as time goes on, and the "longitudinal" valleys are pushed further back, these "subsequent" rivers sometimes succeed in tapping, or capturing, other rivers and streams flowing at a higher level than themselves, which they happen to reach.

The Trent was a "primary" stream when it first started on its course from the high district in the west—a time when the Derbyshire hills were hundreds of feet higher than they now are—and, finding a gradual slope towards the east, thither, of necessity, it directed its steps, cutting through opposing ridges and the more yielding strata alike till it reached the sea.

The Humber, too, was a "primary" river when, ages ago, it left its cradle in the Yorkshire hills; and in its lower course it is one still, or rather the beheaded remains of one, for its upper streams—which Prof. Davis thinks may have been somewhere about Halifax or Huddersfield—are lost. This river, as it reached our land, had the same ridges to cut through as the Trent—the Triassic, Oolite, and Chalk—and it, too, found an outlet in the eastern sea.

At that time, however, as now, it lay at a lower level than

the Trent; and, as it deepened its bed, a "longitudinal" valley began to form on the soft Keuper marls to the south, where the Trent now flows.

The river Idle, which runs into the Trent a little to the north of Gainsborough—and was then an independent stream draining the land round Mansfield where it rises—flowed down this valley, deepening and widening it continually, till it reached the Humber. Other brooks and rivulets, collecting from the land around, helped on the work; and, as this went on year after year, and the valley was pushed back further to the south, the Trent was reached at last, and tapped near Newark; perhaps, as Mr. Jukes-Brown suggests, "on the occasion of some great flood, when the last intervening barrier gave way."

Whether this is correct or not—and something of the kind may have easily occurred—I cannot doubt that, for a very long time afterwards, the two opposing channels struggled for the supremacy, and that the river flowed both ways; but, as the Humber continued deepening its bed, and, as a consequence, deepening and pushing back its "longitudinal" valley also, while the land between Newark and Lincoln, where the old channel ran, was reduced almost to a level, the result was inevitable; the captured Trent gave way at last to the yielding marls of the Keuper, and—no longer a "primary" but a "subsequent" stream—became a tributary of the Humber.

A reference to the accompanying diagram will tend to make this more clear.

This is but a mere outline of the subject, and those who wish to know more of it should read Mr. Jukes-Browne's paper; and also an article in the magazine of the Royal Geographical Society, February, 1895, by William Morris Davis, Professor of Physical Geography, Harvard University, "On the Development of certain English Rivers," which deals with the subject more fully and elaborately than has been attempted by any previous author. A careful perusal of this most able and instructive paper will well repay the reader for his trouble; and, at the risk of wearying you with somewhat technical details, the following short summary of the views put forth in it will not, I think, be out of place.

Prof. Davis begins his paper with the following thesis:—

"The rivers of Eastern England have been developed, in their present course, by the spontaneous growth of drainage lines on an original gently inclined plane, composed of

sedimentary strata of varying resistance. In the course of this development the land has been, at least once, worn down to a lowland of faint relief, and afterwards broadly uplifted, thus opening a second cycle of denudation, and reviving the rivers to new activity; and, in the second cycle of denudation, the adjustment of streams to structures has been carried to a higher degree of perfection than it could have reached in the first cycle." He then goes on to differ with previous authors and workers on the subject—Ramsay, Greenwood, Foster, Topley, Whittaker, Green, Jukes-Browne, and others—in the fact of their starting the drainage of rivers on planes of "marine erosion," whereas he urges that rivers, and sub-aerial forces, account for it all. By such latter agencies, he thinks, and thinks rightly, that land surfaces, hard and soft alike, may in time be reduced almost to a level—a "peneplain" as he terms it.

You will have noticed in his thesis that he speaks of the land, after being worn down to a lowland of faint relief, being broadly uplifted again, "thus opening a second cycle of denudation, and reviving the rivers to new activity." The features of this second cycle, he points out, will differ in two significant respects from those of the first. There would be, in the first place, at the beginning of the *initial* cycle, no *subsequent* streams, all the drainage would be *transverse*, or *consequent* as he terms it. At the beginning of the second cycle the greater part of the drainage would be revived along the *subsequent* streams left by the first cycle at the end of its career; and, with this gain to start with, the adjustments of the second cycle would naturally exceed those of the first. Then, in the second place, the escarpments, or ridges, left by the first cycle would, for some time, retain the even form they were reduced to at the close of that cycle; and, when these two special features occur together in a region, it can, he says, "hardly be doubted that two cycles of sub-aerial denudation have been, more or less, completely passed through in its geographical development." He then goes on to show that this theory is pertinent to the development of the newer rivers of England; for everything, as he says, points to the former higher stand, and greater mass, of the land in the west in the first instance; then to the *consequent* or *transverse* streams that flowed from this high land to the eastern sea; then to the development of *subsequent* streams along the weaker strata, and the diverting and tapping of the primary *transverse* courses as a necessary sequence.

He then considers the evidence indicating that at least two cycles of sub-aerial denudation have been involved for the development of the geographical features of the east of England, the first cycle having reached old age, the second being, at present, in its maturity. "Look," he says, "at the remarkable evenness of the Oolite and Chalk uplands in Yorkshire, Lincolnshire, and other counties." "Remember," he adds, "that the most reasonable view concerning the original extension of the strata of these uplands would carry them high up in the air over the Midland Triassic lowland, and then ask how denudation could reduce the original constructional extension of these strata to the even uplands they now present." "These uplands," he says, "seem to be remnants of a 'peneplain' of sub-aerial denudation, for the reason that their drainage is accomplished, in great part, by *subsequent* streams (as *should* be the case if the present streams are the revived successors of those of a former cycle of atmospheric denudation), and not by streams imperfectly adjusted to the structures (as *should* be the case if the region had been denuded afresh by marine action, and then elevated to its present height)." "Marine denudation," he reiterates, (and this is a well-known physical axiom) "distinctly requires the suppression of all previous drainage systems, and the inception of a new system of streams entirely independent of those beneath; while the hypothesis of sub-aerial denudation, as distinctly requires the retention of a previously adjusted drainage system as a foundation to start with." Marine denudation demanding a drainage without *subsequent* streams; sub-aerial denudation equally demanding a considerable number of *subsequent* streams at the time of upheaval.

Prof. Davis then takes individual rivers in Yorkshire, Lincolnshire, and elsewhere, and points out some of the most important captures that have been made by the *subsequent* streams, as in the case of the Humber and Trent, and he suggests that portions of the original *consequent* or *transverse* rivers may be looked for in various localities; and, for my part, I do not know any more interesting occupation for a geologist than to search for such portions, and to try to make out how, and by what means, their courses have been changed.*

After the Trent was captured, it would no doubt, for a long time, have a tendency to resort to its original course in times

* See note at end.

of flood. The Triassic and Rhœtic escarpment, which now bounds it on the east, is a very weak one at the best; and only here and there, in places like Gate Burton, Gainsborough, and Burton Stather, does it present anything like a formidable barrier; while, in many parts, it is a mere bank, and scarcely that; but, as years went on, and its new channel through the soft Keuper marls was deepened, this tendency would gradually diminish.

The Trent has always been liable to floods. Before its course was changed the narrowness of the Lincoln outlet prevented any rush of water getting away quickly; and the wide extent of ground covered by gravel deposits between Newark and Lincoln shows how greatly the land around was flooded.

At that distant period, also, a powerful tributary, which has left its mark on the land in the shape of an ancient gravel-bed, entered the Trent near Lincoln, adding to the difficulty.

This stream, according to Mr. Jukes-Browne, had its source among the hills near Belvoir Castle, where the small river Devon, its modern representative, now rises.

Other similar streams would doubtless drain into the river from the "longitudinal" valleys on either side, making matters worse, so that, in time of flood, the entire area west of Lincoln would often, for weeks together, be a sea of water. The river Witham, however, at this period followed a course of its own. Instead of running into Brayford, at the foot of the Oolite escarpment at Lincoln, as it now does, it passed, as a "transverse" stream, through that escarpment at Ancaster, and flowed thence into the Wash. How it came to take its present course is not exactly known. It was certainly after the Trent had been captured by the Humber, and it may have been due to the wearing back of the "longitudinal" valley in which it now runs; but, as there are signs of the uplifting of the land in the neighbourhood of the Ancaster gap, through which it formerly flowed, it may, in this way, have been turned aside and forced into its present channel. Prof. Davis thinks its course was changed by capture, and says "One of the greatest successes of the Trent was the capture of the upper Witham, as explained by Mr. Jukes-Browne." As a fact, however, the latter leaves the question open, and I am inclined to think, indeed I see no reason to doubt, that the channel was turned by the elevation of the land at Ancaster, where there has been a distinct uplifting of the strata.

Recently, at one of the meetings of the Lincolnshire Naturalists' Union at Sleaford, I had an opportunity of examining this district, and, in a pit called "Greylees," a few miles east of the Ancaster Gap, I made the following note: "In this pit the rubble at the top of the Oolite is much broken up and contorted, dipping in every direction, and curved and folded in an extraordinary manner, and on the south side of it the underlying rocks show signs of folding. This may be connected with the uplift in the Gap through the Oolite cliff at Ancaster, which lies a few miles off to the west, where the Witham once flowed; and the disturbance of the rubble may be due to the same cause."

The present straight course of the Witham into Brayford, as it approaches Lincoln, is due to modern requirements. Formerly it branched off westward into Boultham parish, where it was joined by the Till, coming from the opposite "longitudinal" valley, half a mile, or more, west of the present High Bridge at Lincoln, before passing through the Gap.

LOUTH ANTIQUARIAN AND NATURALISTS' SOCIETY.

By R. W. GOULDING.

[Reprinted from the *Louth Advertiser*, 6 July, 1895.]

IT is frequently made a ground of complaint against Lincolnshire men that they have done very little towards the elucidation of their county fauna and flora. Now, however true that may be of Lincolnshire as a whole, still there are certain districts of the county the flora of which has been diligently worked, and against these districts the reproach cannot fairly be brought. In Louth, for instance, for many years past there have been at least a few zealous adherents of

botanical science, and scanty though their numbers have been, yet their unobtrusive and careful investigations have yielded, and still are yielding, excellent results. Prominent among the local botanists of 40 years ago were the two brothers Thomas Wemyss Bogg and Edward B. Bogg, who not only collected, preserved and named their specimens, but also recorded the localities where, and the dates when, the said specimens were found. Their valuable collections have been recently handed over to the Rev. E. Adrian Woodruffe-Peacock, who is the custodian of the herbarium which is being formed to represent the botany of the entire county. Contemporary with the Boggs, and with enthusiasm akin to theirs, was the Rev. John Theodore Barker, a man of enlightened mind and attractive personality, who was the author of a pleasant little book entitled "The Beauty of Flowers in Field and Wood," and who was for a number of years the esteemed President of the Louth Mechanics' Institution. Mr. Barker's tenure of the office is memorable by reason of the fact that during it he furthered the interests of the branch of science to which he was devoted by conducting classes for botanical study; and his efforts were so far successful that he communicated some of his own enthusiasm to men like Mr. T. W. Wallis and Mr. B. Crow, the former of whom thoroughly explored the district and formed a herbarium which contains some seven or eight hundred specimens, while the latter still continues his researches with undiminished ardour and activity. Except, however, in these and a few other isolated instances, interest in local botany seemed steadily to decline after Mr. Barker's removal from Louth. But in process of time Mr. Harry Kew arose, and he stirred up his friends and by and by persuaded four of them to join him in forming the Louth Naturalists' Society (the first society of its kind in Lincolnshire), and the somewhat flagging zeal of the elder generation received a fresh impetus. This was in 1884; some four years later the members deemed it advisable to enlarge their borders, and the society was re-organised as the Louth Antiquarian and Naturalists' Society. They have, from time to time, by means of lectures, excursions and exhibitions of specimens, taken many opportunities of endeavouring to advance the objects for the promotion of which they were constituted; and, so far as botany is concerned, they hope that they are doing some really useful educational work. During the summer months their museum is open on Monday evenings, and flowering plants are

usually exhibited and named for the benefit of any members who are interested in the study and who care to attend.

But theirs have not been the only efforts recently put forth to diffuse a knowledge of local botany, for during the past winter the technical committee of the Mechanics' Institution laudably spent some of the funds at their disposal in engaging a competent instructor, in the person of Professor J. W. Carr of Nottingham, to deliver a course of four lectures upon "Plant Life," which lectures proved to be highly interesting and were much appreciated. At the end of his course the Professor intimated his willingness to spend an afternoon with the students in practical field work, if such proceeding were deemed desirable. The Antiquarian and Naturalists' Society cordially approved the suggestion and took the initiative in arranging for a ramble, the day chosen being Thursday, June 27th.

The time for meeting at the London Road Railway Bridge was two o'clock, but, owing to the threatening weather and the attractions of an auspicious celebration at the Parish Church, the party was less numerous than had been anticipated. The faithful, tenacious few, however, whose fixed resolutions quailed not before the menaces of Jupiter Tonans et Pluvius, spent about four hours very pleasantly in wandering over Coxey Hills in company with Mr. Carr, whose ample knowledge and experience enabled him to impart various hints and bits of information which were novel to his hearers. In one cornfield the bladder campion (*Silene cucubalus*) was very common, and Mr. Carr pointed out a nameless variety, with a kind of fringe round the edges of the leaves, which he described as being intermediate between the type and the variety *puberula*. This field also produced lamb's lettuce (*Valerianella dentata*), shepherd's needle, greater knapweed (*Centaurea scabiosa*) and scabious (*Scabiosa arvensis*). In the next field, which was a pasture, a good find was made by Master Hall, whose acute eyes detected a solitary specimen of the dropwort (*Spiræa filipendula*), which has not in recent times been recorded for the immediate locality. Other plants gathered in the same field were:—Purging flax (*Linum catharticum*), betony (*Stachys betonica*), helleborine orchis (*Epipactis latifolia*), twayblade (*Listera ovata*), lady's mantle (*Alchemilla vulgaris*), and pepper saxifrage (*Silaus pratensis*). Among the other plants noted were the great burnet, spurge (*Euphorbia amygdaloides*), tufted vetch, water bedstraw (*Galium*

palustre), fragrant orchis, milk wort (*Pimpinella major*), hedge woundwort, St. John's wort (*Hypericum quadratum*), black bryony, *Myosotis cæspitosa*, *Chara fragilis*, *Apium nodiflorum*, eyebright, giant bell-flower (not in bloom), meadow sweet, sneeze wort, cat's ear (*Hypochoeris radicata*), *Leontodon hirtus*, *L. hispidus*, *Conopodium denudatum*, *Cerastium triviale*, *Potamogeton crispus*, *P. natans* and Tormentil. Among grasses and sedges the following may be mentioned:—Dog's-tail grass (*Cynosurus cristatus*), float grass (*Glyceria plicata*), meadow soft grass (*Holcus mollis*), *Carex disticha*, *Arrenatherum avenaceum*, *Juncus effusus*, *J. conglomeratus*, *Heleocharis palustris*, and *Brachypodium pinnatum*.

VERTEBRATA OF LINCOLNSHIRE.

MAY I appeal to all true lovers of natural history for local lists of animals, birds, reptiles, amphibians, and fishes.

The lists that have already come to hand have been run into a *Locality Register*, like that for the *Flora*, with a view, as the facts accumulate, to working out the distribution of species according to the Natural History Division Scheme, lately published in *The Naturalist* and *Lincolnshire Notes & Queries*.

Bare lists are of great value, but all interesting information should be added for publication. In the case of rare specimens and eggs there should be a note not only of the date, place, and name of Collector, but also where these valuable finds are now preserved. Full notes of specimens that have passed through the hands of professional naturalists are simply invaluable—they see so much.

I want notes especially on the old English Black Rat, Voles, Shrews, Mice, Bats, and Seals and Fish of our coast line.

Everyone's information will be most fully acknowledged.

THE EDITOR.

LINCOLNSHIRE.*

By JOHN CORDEAUX, M.B.O.U.,

Great Cotes, R.S.O., Lincoln; Convener of the British Association Committee on the Migration of Birds.

IT is somewhat curious that even in the present day so much misconception should linger in connection with the second in size of English shires, popularly invested with fens and fogs, ague and marsh fever; a haunt of wild-fowl and waders, reeds and watercress: where the rainfall is excessive, floods the order and not the exception. One of the greatest of modern authors adds to this general prejudice when in commencing his work† he writes 'it was raining down in Lincolnshire,' a remark perhaps as little complimentary as that of Henry VIII., who speaks of the county as 'being one of the most brute and beastly of the whole realm, and of the least experience.'‡ Even at the commencement of the present century Lincolnshire was comparatively a *terra incognita*, and was looked upon as the *ultima Thule* of English counties. This isolation probably in great part due to its position with the broad frontage of a great tidal river and the sea to the north, east, and south-east, separated also, as in the Isle of Axholme and the fens, by impassable swamps and morasses from the rest of England. Thus it came to pass that Lincolnshire folks were considered behind the age, and it is yet somewhat of a reflection on the literary enterprise of the shire that, notwithstanding the materials ready to hand, it should stand almost alone in having no county history.

From north to south, Lincolnshire extends seventy-five miles, and from east to west forty-five. The area is 1,767,962 acres—the Isle of Axholme containing 50,000; of the whole a very small portion, 5,762 acres, now remains which is not either cultivated or in pasture. Fuller in quaint language likens it to 'a bended bow, the sea making the back, the rivers Welland and Humber the two horns thereof, whilst Trent

* Reprinted from *The Naturalist*, 1886, p. 1, by special permission.

† Charles Dickens, *Bleak House*.

‡ Froude, *History of England* (Ed. 1870), Vol. II., p. 527.

hangeth down like a broken string, as being somewhat of the shortest.*

At the time of the Roman invasion Lincolnshire formed part of the territories of the powerful tribe of the Coritani, their district also comprising Rutland, part of Nottinghamshire, the whole of Leicestershire, and some portion of Warwickshire,† Lindum being their chief city and stronghold, their frontier fortresses at Gainsborough, Aukborough, Yarborough Camp, and Caistor predominating the Trent and Humber, which rivers separated them to the north and north-east from their equally powerful neighbours the Brigantes. When the Romans, probably under Ostorius, about A.D. 70, seized Lincoln, they appreciated its commanding site and strongly fortified it. Subsequently it became a chief fortress—one of the nine Coloniæ held by veterans of the legions on condition of rendering military service. They appear also to have utilised for defensive purposes the remaining strongholds of the tribe along the northern frontier, connecting them by roads, *Viæ Militares et Vicinales*. Of these the most remarkable is the Ermine Street running above Grantham to Ancaster and Lincoln, and then leaving the camp at the Newport Arch, the most perfect Roman gateway existing in the country, it ran in a direct line to the north through Kirton-in-Lindsey to Wintringham-on-the-Humber, where there was a ferry at Brough on the Yorkshire side, and hence on to York. Through a considerable portion of its course the 'old strete' is still used for purposes of traffic, in others, as over part of Lincoln Heath and near its northern extremity, it is a wide green lane bordered by gorse, whin, and bramble thicket; and in solitudes which once echoed to the tramp of the cohorts and the heavy rumbling of baggage trains, and in more recent days the march of great English armies towards Scotland, we now listen to the warbling of innumerable linnets, or the monotonous song of the yellow-hammer. The eastern face of the fortress ran nearly in line with the transepts of the present Minster, which stands partly within and partly without the camp. From its commanding position, overlooking an immense extent of country, it must have been practically impregnable. Those indeed who have climbed the steep slopes from the lower town to the castle-yard can form some estimate of its strength, when massive

* *Worthies of England*, Nicholls' Ed., 1811, Vol. II., p. 1.

† M. H. Bloxam, *Lindum civitas Coritanorum*. Linc. Diocesan Arch. Soc. 34th Report, 1877, p. 41 et seq.

wall* was lined with the hardy veterans of the VI. and X. Legions, when iron darts from catapult hurtled through the air, and huge stones from the balistæ bounded down the slopes.

Of the successive waves of conquerors—Saxon, Dane, and Norman—which during the six centuries subsequent to the Roman occupation swept over Lincolnshire, none have so indelibly left their mark as the Dane. The county is still England's Denmark, and the names of 292 towns and villages indicate the prevalence of the Danish element. Of these 212 have the termination *by*, 63 have *thorpe*, one has *with*, four have *toft*, eight have *beck*, and three have *dale*.† Nowhere else, except in Holderness, have the repeated Danish invasions left such landmarks. And, just as in the present the emigrant from our shores to the backwoods of America gives to his small freehold the name of the old home beyond the seas, so likewise his Danish fore-elders, for everywhere in Denmark we find names having close affinity to Lincolnshire villages.‡ Mr. Freeman shows how the Danish invasions of eastern England may be divided into three periods—simple plunder, period of settlement, political conquest.§ Terrible indeed were the ravages, of which oral tradition still lingers, of these ferocious sea-rovers during the first period. Loosing from the opposite shores of the North Sea in the early spring, they sped across in the long ships with big main-sails spread, wing and wing, running before the east wind and tossing the salt spray above the splendours of their richly-blazoned prows, like falcons swooping on their prey. The Humber offered unusual facilities for landing; berthing their galleys in the muddy creeks, as Gaimsby and Tetney havens, where at low-water they lay like painted serpents in the slimy ooze—creeks to which the song of Kal¶ the son of Kali is as yet equally applicable as then:

> Unpleasantly we have been wading
> In the mud a weary five week,
> Dirt we had indeed in plenty
> When we lay in Grimsby harbour.

* The walls of Roman Lincoln are computed at 10 to 12 feet thick, and 20 to 25 feet high. The area of the camp was about six or seven acres.—Linc. Diocesan Arch. Soc. report, 1876, pp. 178, 179.

† Freeman's *Norman Conquest*, Vol. I, p. 437.

‡ The whole subject of the occupation and settlement of Lincolnshire by the Danes has been most ably and exhaustively treated by the Rev. G. S. Streatfeild, in *Lincolnshire and the Danes*. (Kegan Paul, Trench and Co., London, 1884.)

§ Freeman, *Norman Conquest*, Vol. I., pp. 12, 43 seq.

¶ *Orkneyinga Saga*, Anderson's Ed., p. 76.

There is scarcely a church on our eastern coast which shows not, in some part or other of its structure, red and calcined stones suggestive of Danish ravage; and it is by no means improbable, as is asserted,* that beneath the broad-headed nails which stud the oaken doors may still be found some withered fragment of the skin of sacrilegious viking.

Of dread potent was the hoisting on the Saxon shore of the Raven banner, surnamed the 'Landwaster';

> For there
> Was shedding of blood and rending of hair,
> Rape of maiden, and slaughter of priest,
> Gathering of ravens and wolves to the feast.

Yet one hundred years later throughout the peaceful Danelagh the savage marauder had become transformed into the peaceful tiller of the soil. What the physical characters of the county were in the second period we may conjecture from the positions chosen by these vikings or 'creekers' for their permanent homes, placed at regular intervals on the slopes or near the foot of the uplands, overlooking the low country or marsh. The house or *by* rising on a foundation of stone—chalk quarried from the wold—the upper part of 'stud and mud' with wattled outbuildings and 'crews,' surrounded by '*garth*' and '*wong*.' Above them stretched the open wold, rolling uplands of heather and gorse, and coarse tussocks of *Aira cæspitosa* and the barren brome grass, stretches of brake bright green in spring and golden-brown in the autumn; here and there solitary hawthorns quite grey with lichen, storm-twisted and venerable; and on the highest ridges many a tumulus and 'hoe'—long since obliterated by the destroying plough. A land without inhabitant; the haunt of bustard and stone curlew, golden plover and dotterel, where in deep dales by chalk stream sides the otter had his home, and in the twilight the red deer and roe came down to graze. Below the wold, covering much of what is now known as the middle marsh, stretched the wide forest of oak, beech and elm, with an undergrowth of holly, hazel, and yew; dense thickets of blackthorn and bramble, where lurked the grey wolf, wild boar, and wild cat; and above falcon, kite, and buzzard held almost undisputed posses-

* In a footnote, *Lincolnshire and the Danes*, p. 4, Mr. Streatfeild says 'the four churches with which such traditions are distinctly connected are Rochester Cathedral, Westminster Abbey, and the churches of Hadstock and Copford in Essex. In the case of Hadstock, the last fragments of skin did not disappear until 1846; and in that of Copford, not until 1843 (see Archæological Journal, Vol. V., p. 185; Vol. X., p. 167).

sion. Beyond the forest was the rich pasture of the maritime marshes merging into salt 'fitties,' purple with sea-lavender and thrift, or grey with the frosted sea-orache, muddy stretches, green with glasswort, and then the flat seabeach—

> A coast
> Of ever-shifting sand, and far away
> The phantom circle of a moaning sea.

Then beyond Horncastle and Spilsby, where the chalk dips below the fen 'from the foot of the wolds, the green flat stretched away illimitable, to an horizon where from the roundness of the earth, the distant trees and islands were hulled down like ships at sea. The firm horse-fen lay, bright green, along the foot of the wold; beyond it the browner peat or deep fen; and among that, dark velvet alder beds, long lines of reed-rond, emerald in spring and golden under the autumn sun; shining 'eas' or river reaches; broad meres dotted with a million fowl. . . . Here and there, too, upon the far horizon, rose a tall line of ashen-trees, marking some island of firm rich soil. . . . Overhead the arch of heaven spread more ample than elsewhere, as over the open sea; and that vastness gave, and still gives, such cloudlands, such sunrises, such sunsets, as can be seen nowhere else within these isles.'* This was the land of the Girvii or Fenmen, a tribe of Angles who, even in Danish days, remained practically unsubdued within the fastnesses of their impassable morasses.

During the Norman period Lincolnshire contained no less than ninety religious foundations—Abbeys, Monasteries, Preceptories of Knights Templars, alien Priories and Hospitals; four principal castles—Lincoln, Tattershall, Carlton, and Sleaford; and nine crenellated or fortified mansions. Most of these have entirely disappeared, and there is perhaps no other county so utterly devoid of picturesque ruins. With the exception of the great gateway of Thornton, near Ulceby, the Western part of Crowland, and some remains at Tupholme, Kirkstead, and Louth, and the castles at Lincoln, Somerton, and Tattershall, scarce a remnant now remains, and even the site of the buildings is in many cases with difficulty made out.† Nowhere else in England, however, do we find so many

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* Kingsley's *Hereward.*

† For a list of Lincolnshire Religious Houses and Castles, see *The Lincoln Pocket Guide*, 1880, pp. 178–180, by Sir C. H. J. Anderson, Bart.

interesting churches dating from early Saxon times down to the close of the Perpendicular period at the end of the 15th century. Perhaps the most remarkable among many is the 'Mother of Lincoln,' the Saxon church at Stowe, which for some time was the throne of the Bishops of Lindisse, before removal to Lincoln. Lincoln itself at one period contained fifty-two churches, reduced in the reign of the sixth Edward to thirteen. At Boston the magnificent tower of the parish church, 260 feet high, the 'stump,' as it is called, predominates the fens, and it is a prominent object both by sea and land from an immense distance. In times of fen floods the bells were rung to warn the district of the impending danger.* The spire of the church at Louth, in North Lincolnshire, is 294 feet high, and yields to none in England for symmetrical proportions and beauty of decoration. An interesting feature of this church is the weathercock, which was placed in position on Holy Rood-eve, 1515, being made out of a copper basin taken two years previously from the Scottish king by the men of Lindsey, at the battle of Flodden.† St. Guthlac's Abbey of Crowland was entirely destroyed by the Danes in 870; but, as some compensation, on its rebuilding it was richly endowed with gifts by Canute—not the least remarkable of these being the skins of twelve polar bears for the altars, so that the feet of the officiating priests might be kept warm.‡ Crowland at one period had six bells, the 'sweetest in all England.' Much of the beauty and durability of Lincolnshire churches is due to the Barnack-ragstone, which in mediæval times was carried by water from the quarries of that name in Northamptonshire to every part of the county. It is a coarse-grained shelly oolite, and probably the most durable freestone in England. The working of the stone appears to have been almost entirely abandoned before the commencement of the 15th century, probably from the exhaustion of the quarries.§

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* Miss Ingelow, herself a Lincolshire worthy, in her poem *The High Tide on the Coast of Lincolnshire* (1571), graphically pictures the perils of fen life in flood time, when the great bells of Boston rang out night and day to the warning tune of 'The Brides of Mavis-Enderby.'

† *Lincoln Pocket Guide*, p. 72.

‡ *Monasticon Anglicanum*, Dugdale, Vol. II, p. 96.

§ See Miller and Skertchly, *The Fenland Past and Present*, 1878, pp. 78, 79.

VALUE OF A SALMON FISHERY ON THE TRENT.

PERHAPS the following particulars relating to the value of a salmon fishery at different times during the last 130 years may be interesting. The particulars relate to a "several" fishery on the river Trent, at East Ferry, extending two miles, belonging to the manor of Scotton.

In 1743, in a rent-roll of John Hayley, lord of the manor of Scotton, George Newcombe was tenant of a small farm at East Ferry with the fishery, at £35 10*s*. a-year. In 1750, in a rent-roll of Vansittart Hudson, then lord of the manor of Scotton, Robert Goodburn was tenant of the fishery alone at £4 a-year, and widow Newcome kept the farm.

In 1752 the fishery was leased for twenty-one years to Robert Goodburn at £6 a-year; and in 1754 sub-let to C. Wilkinson for £8 a-year. In 1771 it was reduced to £4 a-year. In 1801 Sir John Frederick was lord of the manor of Scotton, and the fishery was rented at £10 6*s*. In 1802 it was leased for twenty-one years to Thomas Wilkinson for £21 10*s*. In 1815 the rent was reduced to £4, and it was let with the farm; so it continued down to 1867, when it was separated from the farm and leased by Sir Richard Frederick, lord of the manor, for seven years at £7 a-year. The decreased value in 1815 was attributed to the introduction of steam packets from Hull to Gainsborough up the Trent. The salmon were prejudiced against steam as an invasion of the rights of their river by such an ogre, and left; but the take of salmon at this fishery has wonderfully increased in the last ten years, and, as the steam packets have increased also, some other reason must be assigned for the removal of the prejudice in the salmon against their ancient haunts. The net profit to the lessee in 1873 was £100, and the fishermen earned £40 each, thus clearly proving that the increase of the salmon in the river Trent is due to the remedial measures taken by law to preserve salmon, or else that this "several" fishery was let very much under its value since 1815. The Trent is a late river, and fish begin to run up the end of May. In 1873 the average weight of salmon taken at this fishery was 12lb. each.

THE EDITOR.

THE STORY OF THE LINCOLN GAP.

By F. M. BURTON, F.L.S., F.G.S.,

President of the Lincolnshire Naturalists' Union, being the Presidential Address, delivered at Lincoln, 1895.

PART II.*

In 1882, the late Mr. J. T. Padley—well known in the county as an accurate and painstaking engineer—published a work "On the Fens and Floods of Mid Lincolnshire," to which we are indebted for much valuable information. Before the Romans came, he says, "every flood of the Trent flowed down to Lincoln through the Gap, and on over the fens to the sea," part entering in at Friskney and Wainfleet Havens, and the rest at Boston. These flood waters came mainly through five openings in a range of low sandhills, extending from the village of Girton in Nottinghamshire to Marton Cliff in Lincolnshire. These openings are at Spaldford, Newton, the Foss Dyke entrance, Torksey, and Brampton; and the most southerly one—at Spaldford—being the highest up the valley, was the most dangerous.

The far-seeing Romans, who did so much good work in the country, built banks across these openings, prior to which the Trent had access through them to Lincoln; and then, having received the waters of the Till and Witham, it had to pass through the narrow gap, thus raising the water to a great height, as a boat chained to a stake at Motherby Hill, 340 yards north of Brayford, proves; then, having gone through the Gap, the water flowed down into the fens, and, being joined by the Langworth river, the Bain and other streams, covered all the low land down to the Wash, leaving "Swineshead, Bicker, Wigtoft, Boston, Skirbeck, Sibsey, and all the Holland towns (or tofts as they are called by Dugdale) mere islands in the water."

The Spaldford bank, which is from 12 to 15 feet high on the road from Girton to South Clifton, is a mile and a half long, and stands now a mile to the east of the river; and Mr. Padley gives us a very graphic account of a flood which

* *Lincs. N. & Q.*, "Nat. Hist." Section, 1896, p. 53.

occurred in 1795 when this bank gave way, and a great part of Nottinghamshire and Lincolnshire was flooded. To the west of Lincoln nearly 20,000 acres were covered to the height of 10 feet above the present level of the land, and remained so covered for three weeks, during which time the only remaining communication between the villages around, and for those going to Lincoln market, was by boat. The people at Saxilby had to get on to the higher ground in the village, the lower part being under water, and many lived in the church. The frightened cattle had to be rescued by boats from the knolls on which they had gathered. The water ran over the High Street at Lincoln; and, on the far side of the gap, the land was converted into a sea. Such a flood as this, one would have thought, would have roused up the people to look after their interests; but, Mr. Padley tells us, from the time the Romans first made the banks referred to, up to 1852—when one of these great floods occurred—beyond a temporary patching up as occasion required, they were entirely neglected; a sign both of the apathy, and of the contented state of the people in those days.

This great flood of 1795 occurred at Candlemas; and it is curious to note that, at Candlemas of the present year (1895), just a century later, and owing to the same cause—the melting of the snow after a long and severe frost, when the frozen ground was unable to absorb the moisture—the Trent bank a little above Gainsborough gave way, and this, notwithstanding the resources and experiences of another 100 years.

Since the year 1852, the attempts to keep out the floods from the Trent and the fens have been carried out on a more systematic scale. Up to that time the low land in Boultham, North and South Carlton, and Broxholme, were mere swamps covered with water the greater part of the year, while the fens to the east of the Gap were in a permanent state of flood.

The reclaimed land, at first, was of little value for ordinary agricultural purposes, 2,500 acres at Blankney being let by auction, Mr. Padley tells us, for £10 per annum. Now, in many of these reclaimed areas, we have the richest pasture land in Lincolnshire.

Many amongst us can well remember the great changes which have taken place in the fens by drainage. In the early part of this century, and far later, you might look down over the fen country, winter after winter, and see nothing but water for miles. Skating to Boston was a common event; long lines of water-fowl flitted across the sky; "kite upon kite" could

be seen on the wing; starlings whirled about in clouds, and broke down the reeds as they settled upon them; and, where now the great engineering works of Lincoln are carried on, flocks of wild swans were seen, and the booming of the bittern was heard.

The fens were a sure and easy means of livelihood to those who dwelt in them. They netted the fish and trapped the eels, they stalked and shot the wildfowl, and brought them all on market days to the towns around. Many of them lived on the water in house boats nearly all the year through; while those on the outskirts kept large flocks of geese and sheep on the rich grass lands; and all loved their wild free life. No wonder, then, that, in 1768, numbers of them, fearing the loss of their old privileges, assembled to prevent the inclosure of Holland Fen. Unfortunately they committed great excesses, for they were a wild and lawless set. Men were shot; horses and sheep barbarously killed and mutilated; houses and haystacks burned, and much mischief was done: and, though all this must be deplored, there is many a Lincolnshire man left who can feel with the old fen-men yet. To many amongst us the fen district is still a happy hunting-ground, and a land full of beauty as well. Many there are who see in it no mere level waste, but a land of glorious landscapes and happy feeding cattle; of rich sunsets and flights of birds; a land of rare water-plants and reeds; of deep, clear pools where the big pike lie; and of

> "tangled water-courses . . . ,
> Shot over with purple, and green, and yellow."

We have only now to enquire whether the sea took any part in all we have been considering, or whether it was the result of river action alone.

The low land to the east of the wolds has, no doubt, since glacial times, been frequently covered by the sea: the Romans, in fact, raised the sea bank to keep it out. The Witham also, until stopped by the locks at Boston, was tidal; and the sea would often run over the land long after the fens were reclaimed, and partially drained,—as J. Ingelow records in her well-known poem, "The High Tide on the coast of Lincolnshire, 1571";—and, even as late as 1779, Mr. Padley, in his work before referred to, speaks of "many vessels on the Lincolnshire coast being driven two miles in the marshes during a heavy gale."

Besides this, a reference to the drift map of the Geological Survey round Lincoln will show remains of marine peat, and

marine fen silt, in the fens to the east of Lincoln, in the parishes of Branston and Dunston; and the skull of a Walrus was not long since dug up from the peat near Ely; indicating that this animal formerly inhabited the valley of the Ouse, which, at that time, was probably an estuary.

To the west also, where the Trent valley lies, it is quite probable that the sea occasionally covered the land in past times before the river was banked; but this would be only for a time, and during exceptionally high tides; and when we think how low the land is on that side, and that the ægre, or tidal wave, which runs up the Trent, is felt quite 14 miles above Gainsborough, we cannot wonder at it.

In addition to this, there are proofs of the near presence of the sea in the finding of recent marine shells inland. Some, Mr. J. D. Carr informs me, were met with in Newland, at the foot of Lincoln Cliff, during some alterations a few years since. They consisted chiefly of *Cardium edule*, *Mytilus edulis*, and *Littorina littorea*—the common cockle, mussel, and periwinkle—and they were all dwarfed, as is invariably the case when marine molluscs are found living in salt, or estuarine, marshes, with a large admixture of fresh water. Mr. Carr, in writing about them, says they were "involved in a marine peat containing a good many bones, a large number being those of birds; the peat underlies the whole of Newland, Guildhall Street, and Brayford, and I should think (though I have seen no sections) the east side of the city also; the whole rests on the Capricornis zone of the Lias." Besides this, the valve of an oyster shell, having the sandy case of a marine annelid attached, mixed with bones of deer and horse, and pieces of wood, was found recently in Mr. Pearson's new brickyard on the Trent bank at Gainsborough, 14 feet 6 inches below the surface, in a bed of sand underlying warpy clay; and, as the worm case is unbroken, and in good preservation, it could not have travelled far, and had probably been cast up by some stronger tidal rush than usual, which burst over and flooded the land. Beyond, however, these temporary occupations and incursions, there is no record of sea action; and, in forming the contour of the land, its escarpments, valleys and plains, the sea took no part.

Rivers to start the grips, and atmospheric forces to widen them into valleys, is sufficient for it all. We want no other aid.

Such is the story of the Lincoln Gap; one of the many

pages in nature's book which lie open at our feet, and which it is our privilege to read if we will. The study of it is wide and far-reaching, for, in the evolution, or development, of the Trent, we have a clue to the history of many another river and stream; and, by the aid of the new and strong light thrown on the subject by Prof. Davis, in his recent admirable paper, we shall be able to trace the birth of many an inland escarpment, valley, and plain, the origin of which is at present unaccountable, or, to say the least, obscure.

NOTE.—In connection with this subject and Prof. Davis' paper, an article, which appears in the July number of the *Royal Geographical Soc. Mag.* for this year, was read before that Society on the 23rd March last, by J. E. Marr, F.R.S., Sec. Geol. Soc., on "The Waterways of English Lakeland," in which he alludes to river action, and speaks of the origin and diversion of the Lune and Eden in that district; and in the discussion which took place after the reading of the paper, Mr. W. T. Blanford, F.R.S., Treasurer of the Geol. Soc., said:

"The history of the river valleys is one of the questions of modern geology, a question which has arisen within my recollection, and which was almost ignored by many of the great geologists 50 years ago." . . . "Rivers are of very ancient origin; in many cases they are older than the mountains they traverse. All sorts of explanations have been adopted for the fact that a great many rivers run across mountains from side to side, and there is no doubt that all sorts of explanations may be necessary, because the fact is an extraordinary one. A very simple explanation, but a most obvious one when fully conceived, is the simple fact that the river existed before the mountains, and as elevation gradually took place, the river kept its way, cutting through the mountains. Two of the most extraordinary cases known are those of the Indus and Bramaputra, cutting through the Himalayas, and actually running from one side to the other of the biggest mountains in the world, and that this is so is probably due to the fact that the rivers were there before the mountains existed." . . . "I think that, as a contribution to the history of rivers, Mr. Marr's paper is of particular interest, because he shows not only how the rivers make their valleys, but also how rivers change their courses."

Dr. H. Woodward, F.R.S., late President of the Geol. Soc., who also spoke, said: "One of the things that strikes one most is the way in which rivers have continued to hold certain directions through great changes in the denudation of the country."

Dr. H. R. Mill said: "It must have struck some, when Mr. Marr described rivers wandering over the country, and valleys working backwards to behead and capture the waters of other rivers, that the land is in a very much less stable condition than they had been in the habit of thinking." . . . . "In America Prof. W. Morris Davis, and in France Prof. de Lapperent, had elaborated a method of studying these phenomena, and I am pleased to see that Mr. Marr, while acting independently in the same direction as these gentlemen, has, for purposes of popular description, avoided their terminology. In its proper place, the theoretical elucidation of practical problems, a precise terminology is essential, and in introducing one for such purposes Prof. Davis has rendered an inestimable service."

Mr. H. J. Mackinder, Reader in Geography at Oxford, who is one of the members of the Lincolnshire Naturalists' Union, said:

"There is one point which struck me in what Dr. Mill said just now by way of commendation of Mr. Marr, that he had avoided the use of the terms with which Prof. Davis had equipped this branch of the subject. I agree with him that this

evening it was probably right to avoid the use of these terms, but I trust that no one will carry away the idea that they are therefore without use. Mr. Davis has done a very valuable thing in giving us terms which, with all due deference to Dr. Mill, I cannot regard by any means as so uncouth as those with which most sciences are equipped. 'Subsequent,' 'Consequent,' and so forth, enable us at once to compare the rivers and parts of rivers we have studied in any particular district with other rivers. During the whole evening I could not help feeling how admirably the intellectual analysis implied in Mr. Davis' terminology fitted with every sentence by Mr. Marr."

Mr. Marr in reply to the comments of the several speakers, said:

"I am glad to hear Mr. Mackinder take up the cudgels in favour of Prof. Davis' terminology, though it is somewhat technical; but had I used it instead of hurrying over sentences which my hearers found it difficult to follow, I should have been able to replace sentences with words pregnant with meaning."

I am very glad to see this worthy tribute paid to Prof. Davis' admirable exposition and work.

A SHORT ACCOUNT OF A COUNTRY PARISH;

With some notes relative to the effects of game preserving on its Natural History.

By Mrs. C. E. JARVIS.

PART II.*

BIRDS.

BIRD life is perhaps more affected by game-preservation than any other, as a good gamekeeper, in the eyes of his master, is one who does his best to extirpate all birds of prey, as well as those of the crow tribe; this causes a great increase in the number of wood pigeons, sparrows, and other small birds.

The following are either resident or migrate in spring and autumn:—Missel thrush, Song thrush, Field fare, Blackbird, Whin-chat, Redstart, Redbreast, Nightingale, White throat, Lesser White throat, Gold crest, Chiff-chaff, Willow wren, Sedge warbler, Hedge sparrow, Long-tailed tit, Great tit, Cole tit, Blue tit, Tree creeper, Wren, Pied wagtail, Grey wagtail, Meadow pipit, Tree pipit, Spotted fly-catcher, Swallow, Martin, Goldfinch, Siskin, Green-finch, Sparrow, Chaffinch, Linnet, Redpoll, Bull-finch, Yellow-hammer, Sky-lark, Starling,

* *Lincs. N. & Q.*, "Nat. Hist." Section, 1896, p. 48.

Jay, Magpie, Jackdaw, Carrion crow, Hooded crow, Rook, Swift, Great black woodpecker, Green woodpecker, Kingfisher, Cuckoo, Ring-dove, Barn owl, Tawny owl, Buzzard, Sparrow-hawk, Peregrine falcon, Kestrel, Mallard, Pheasant, Red-legged partridge, Common partridge, Land rail, Moor hen, Lapwing, Heron, Woodcock, Black-headed gull.

In addition to these, Swan, Geese, Wild duck, Pigeon, Golden plover, and common Curlew have been seen to pass over flying, and there may have been other and rarer birds unnoticed.

If the winter is severe the song thrushes depart, and are not so plentiful the following spring. We had several blackbirds more or less speckled with white, and one with a foot missing frequented the Rectory garden for two years; his misfortune did not prevent him from finding a mate. A few whinchats return every year; one pair can always be found about the same hedge. Redstarts are rare, as there are no stone buildings or walls in the parish; a pair or two frequent the woods. The nightingale from being a passer-by remained to breed, though I never actually heard of the nest being found; on a still evening it can be heard a quarter of a mile off. Nightingales have increased very much in Lincolnshire of late years. The white throat and willow wren are very common, especially the latter; the chiff-chaff less so. The gold crest is plentiful in winter, and some remain to breed; I found a nest in April, 1882, full of eggs; it was beautifully made, of moss, almost as round as a ball, and suspended at the end of a spruce fir branch. The parent birds attracted my attention by their shrill noise. By May 1st the young were hatched. I only once saw a pair of tree-creepers. Pied wagtails migrate in winter, and return regularly in the middle of March. In July, 1882, two young cuckoos were hatched by wagtails, and brought to the garden to be fed. I noticed the first on the 16th, and was able to observe it from the window. On the ground it was very awkward; when following the wagtail for food it took two or three hops, then flew a little way, and opened its orange-lined mouth very wide. At times it sat on the edge of the sunk fence, and whilst the wagtail was was searching for food running backwards and forwards; the cuckoo never ceased screaming. When the wagtail could not conveniently reach its mouth it sat on its head and put the food in from above. On the 23rd a second cuckoo appeared with another wagtail in attendance, this cuckoo being rather smaller and differently marked.

I have now and then seen yellow wagtails in winter, but was never sure of the species until one day in November, 1890, under cover of a thick fog, I got close to a pair near the beck, which proved to be *Motacilla melanope*, the grey wagtail. They were restless, but occasionally perched on the hedge.

Swallows are not so numerous as house martins. There were two nests about the Rectory; one glued to the inside wall of the pig-stye, the other on a ledge in the coal-house or sometimes on a shelf in an out-house. On Aug. 26th, 1877, I saw a young buff-coloured swallow flying with others. Swifts do not build in the parish, but are constantly to be seen and heard in summer, especially in the evening. The goldfinch has been known to nest, and the young have been reared. In March, 1891, a flock of 20 visited a lime avenue leading to the Rectory. Flocks of redpolls and siskins frequent the hedges and shrubberies in spring and autumn. Siskins are very tame; they are fond of the seeds of the cypress, and on one occasion found something in a cabbage bed they liked. Their sweet song cannot be mistaken when almost all other birds are mute. Of late years thousands of starlings have made a young wood, in the middle of the estate and far from a road, their resting-place. They arrive in flocks from all quarters and alight first in hedgerow trees, where they spend some time chattering before finally flying off to the wood. A good many pairs rear their young in chimneys, ivy, and holes in trees; to the best of my belief they are not double brooded.

There is no large rookery; there were about 14 nests at one time in some old hedgerow elms in the "Hall Close," where the old hall is said to have stood. The rooks all deserted those trees one spring and came to a group of elms on the glebe, within sight of their old homes. An old woman who lived near said they left because the keepers fired into their nests. Shooting the young ones will not drive them away, as is well known, but it appears they dislike shot in their nests. Food may have had something to do with the "flitting," for when there was snow on the ground, the rooks would come and steal the food thrown out for the small birds; so they were given bones and large crusts, which they carried off, leaving the little birds to eat their crumbs in peace.

A pair of great black woodpeckers was seen in the spring of 1890, and one was unfortunately shot. In the autumn the green woodpecker is very fond of pecking about in rank grass, and looks very comical with its head held at such a curious

angle, and its body very upright. A pair of kingfishers inhabit the same holt as the nightingales; the beck runs through it, and they make their nest in the bank. Moorhens also build there; their nest has been found in a spruce at some distance from the water. A pair of common buzzards used to build year after in a wood just outside the parish boundary, and notwithstanding the plundering of their nests and constant persecution they did not desert the locality till about 1888. In November, 1883, a pair was trapped in Hatton. In May, 1879, there was a kestrel's nest in the nightingale wood; the keepers had the cruelty to wait till the young were hatched before climbing the tree to take the nest, as they said if they failed to shoot the old birds, at any rate they would not rear a second brood. They uttered a wild plaintive cry when one approached the nest tree, and as it is known they do more good than harm they ought to be spared. I once saw a sparrow-hawk drop a full-grown partridge, which lost a good many feathers but ran off unhurt. A sparrow-hawk once dashed against the window during a sewing meeting. As quick as possible a woman ran out and wrung its neck. On my remonstrating, she said, "If you knew the damage they do amongst our poultry, you would do the same." I had it stuffed.

Ring doves at one time increased to such an extent, and did so much damage to turnips and cabbages, that after the shooting season the owners of the various estates agreed to shoot them on one fixed evening every week, which diminished their numbers to a great extent. On Oct. 14th, 1881, a young pigeon, unfledged, fell out of its nest during a gale.

There are a certain number of wild pheasants, amongst them a white one now and then, but the greater number are reared by hand, the eggs being collected from nests likely to be disturbed, and more obtained by shutting up some of the birds and setting their eggs under barn-door hens. They are brought up like chickens, and remain quite tame till the shooting season, running to the keepers to be fed. They give employment to several men, who take it in turns to sit up all night to watch the coverts and scare away foxes, etc.

Partridges are far more interesting than pheasants, being more truly wild. Their call note, especially in the evening, is a very pleasant sound. The land rail or corn crake is an occasional visitor; I only remember one summer when they stayed. They seem to me to have become scarcer, or perhaps they prefer limestone to clay, for they were plentiful about

Lincoln formerly. A few pairs of lapwings nest in an upland pasture, and larger flocks come in winter; their eggs are often broken by the plough. Black-headed gulls are also winter visitors; they come from their breeding places at Twigmoor near Brigg. Larger gulls are sometimes with them, or come alone, but I never could determine the species. *Larus ridibundus* loses its black head when the breeding season is over.

I will now add what the keeper said about birds in 1891 :—

"We were very much troubled two years ago with a perigrine falcon; it killed a lot of partridges and some pheasants; we have had them here before, but not to stay as this did, it was here for several weeks. We could not trap it, as it never came a second time to eat of what it had killed. Cook (an under-keeper) shot at it, it was never seen afterwards, I think he must have killed it. It is two years since I saw a buzzard, they are getting very scarce. We have plenty of jays at Hatton Wood and Chambers' Wood, they breed there; magpies as well, but they are not as plentiful as the jays. I saw near Chambers' Wood the other afternoon fifteen jays fly out of a hedgerow, one after the other, into the wood.

The sparrow-hawk is very troublesome with the pheasants. We have trapped and shot about eleven this season, and there are several about yet; we see very little of them until the end of July. Last year I killed near the pheasants fifteen or sixteen; have killed something about the same quantity for several years. We have a lot of trouble with the kestrel when the pheasants are first hatched; I believe they take them for mice. Perhaps you may have heard of the white partridge that was bred at Hatton about three years ago. A pure white starling was killed at Hatton last year."

The white partridge strayed off the property and was killed and stuffed by a neighbouring land owner.

The thickness of the game upon the ground seems to attract birds of prey in considerable numbers, only to be, for the most part, trapped or shot. With regard to the noble peregrine, it is well known that they will fly as far as 50 miles in search of food for their young, so this one may have come from the cliffs of Yorkshire or the Peak of Derbyshire.

Game rearing cannot be said to affect the botany of a district to any great extent, on the whole it is in favour of the botanist. The cutting down of some woods and planting of others encourages certain plants, and some fields of stiff clay, left in a state of nature for the benefit of the pheasants,

produce a great number of "weeds." One plant *Polygonum Fagopyrum* was probably introduced as pheasant food. The district, varied by woodland meadow, clay and sandy soil with a small stream and mossy ponds or "pits," affords a good variety of plants, the local Natural History Society having collected in 1891 about 300 flowering plants exclusive of sedges, rushes, and grasses. This little Society owed its existence to the wheelwright, an enthusiastic botanist and bird-stuffer. He was inspired at a very early age by an old woman, a herbalist, to whom many came for advice, and for whom he collected herbs, and thus got to know their names and properties before he went to school.

Hound's tongue still grows near the house she once occupied and is thought to have been introduced by her. The wheelwright inherits from his old friend a strong faith in herbs as remedies, and when through an accident he lacerated one of his fingers badly, he applied a plaster of adder's tongue chopped up, until the wound was healed. He is the possessor of several old-fashioned botanical works, such as Withering; and was acquainted with the Lennœan system only, until Bentham's excellent Annual was introduced to his notice. His brother, a working farmer and excellent gardener is also a botanist, and when hoeing spares any weed he does not know, until it has flowered and he can ascertain its name. The brothers own mowing and reaping machines and when working them always look out for strange plants, especially among "seeds." In these and other ways they have identified several which might otherwise have been overlooked, such as: *Senebiera Coronopus*, *Melilotus officinalis*, *Anthyllus Vulneraria*, *Caucalis nodosa*, *Anthemis nobilis*, *Cnicus acaulis*, *Centamea nigra*, variety *decipiens*, *Cichorium Intybus*, *Picris echioides*, *Campanula latifolia*, *Anagallis cærulea*, *Samolus Valerandi*, *Echuim vulgare*, *Solanum nigrum*, and *Botrychium Lunaria*, none of them common in the neighbourhood. They found other rarities during their botanical rambles further afield, generally on a Sunday afternoon. Walking through one of their meadows one day, we came across a labourer pollarding some willows; he had left in the middle of one of them a straight young tree, with bark of a different colour to the willow, and, being winter, denuded of the leaves. Asked what it was, he said, "a wicken tree," and that his master had instructed him to leave it as a curiosity, its roots probably reaching through the willow to the ground. The wicken, or mountain ash, is

rare in this part of Lincolnshire, except when planted in woods, but it was formerly much thought of as a charm against witch-craft. Rev. E. G. Cole, in his *Glossary of Words in use in South-west Lincolnshire*, gives the following example of its use: "There's *heder* wicken, and there's *sheder* wicken, one has berries, and the t'other has none; when you thought you were overlooked, if the person was *he* you got a piece of sheder wicken, if it was *she* you got heder wicken, and made a T with it on the hob, and then they could do nowt at you."

Besides the wheelwright and his brother, all the other members of the Natural History Society were successful in contributing specimens to the district botany, with the result above stated. White varieties of flowers frequently occur, the most noteworthy being some pure white examples of *Scabiosa succisa* in a meadow since ploughed up, and *Ajuga reptans*, observed to be persistent in the same place year after year.

A small hayfield full of *Saxifraga granulata* is worth mentioning; also that *Stratiotes aloides* introduced into a pond took root and multiplied quickly. The latest addition is *Epipactis latifolia*, which has appeared within the last two years, and the most conspicuous, a gigantic specimen of *Onopordoin Acanthium*, which, most appropriately, sprang up in the wheelwright's new garden and attracted great attention. It measured, when in flower, about six feet high, and must have been quite three feet in circumference. With this wonder of nature, I will conclude my paper.

LINCOLNSHIRE.*

By JOHN CORDEAUX, M.B.O.U.,

Great Cotes, R.S.O., Lincoln; Convener of the British Association Committee on the Migration of Birds.

PART II. †

THE geological strata of Lincolnshire extend in long ribbon-like bands, which generally correspond to the length of the county, running nearly north and south,

* Reprinted from *The Naturalist*, 1886, p. 1, by special permission.

† *Lincs. N. & Q.*, "Nat. Hist." Section, 1897, p. 65.

and with a dip to the east, overlapping in regular succession, not unlike the leaves of an open book.* Much of the picturesque beauty of the shire is due to the two main ranges of hills, the chalk wolds and the oolite, having an easy slope to the east, and more or less bold escarpments to the west. The chalk or wold district commences at Barton-on-Humber, and terminates near Burgh-in-the-Marsh, fifty-two miles, dipping beneath the fen to appear again beyond the Wash at Hunstanton, its greatest breadth is fourteen miles. The oolite runs like a spine through the whole length of the county, and is represented by a narrow band in the north and south of Lincoln (where it is once cut through and divided by the bed of the Witham), spreading into the wide elevated district known as the 'Heath,' where on its western side it forms the striking escarpment called the 'Cliff,' predominating the level lias and new red sandstones of the Trent Valley. Between these ranges of the chalk and the oolite lies the great central plain of Lincolnshire—greensands, gault, Kimmeridge, and Oxford clays; these all in South Lincolnshire pass beneath the peats, clays, and gravels of the fens. There is still a third line of elevated land formed by the Lias, Rhætic, and red-marl beds extending from the mouth of the Trent to as far as Gainsborough. At its northern extremity, near Scunthorpe, is the rich bed of iron ore, twenty-seven feet thick, which has already added so much to the wealth and importance of this otherwise poor and barren district. A section across the county from east to west at its greatest breadth, passes first through the chalky boulder-clay, overlaid in north-east Lincolnshire by a considerable thickness of *warp*, and generally along the maritime plain by recent alluvial deposits, sand, and clays. In the Humber marshes borings for water show twelve to forty-five feet of clean stoneless warp, with an occasional cockle-shell; beneath the warp is the forest bed, two and a half feet in thickness, resting on about a foot of whitish clay and sand. This old indigenous forest crops out at various places, both within the Humber and the sea coast, at low-

* The Journals of the Geological Society contain several important papers on the geology of Lincolnshire, which may be studied with advantage by those who take an interest in the subject, such are '*Rhætic beds near Gainsborough*;' '*Strata which form the base of the Lincolnshire wolds*,' 1867, Vol. XXIII., pp. 315, 227; *Glacial and Post-glacial strata of Lincolnshire*, Vol. XXIV., 1868, p. 146; *Neocomian strata of Lincolnshire*, Vol. XXVI., 1870, p. 326; *Lias and Oolite of north-west Lincolnshire*, Vol. XXXI., 1875, p. 115; *Southerly extension of the Hessle Boulder Clay*, Vol. XXXV., 1879, p. 397.

water mark, presenting clay beds thickly interlaced with roots, also scattered stumps of trees *in situ*, identified as oak, beech, elm, birch, holly, yew, hazel, alder, and willow. The only remains of animal life we have found was during the excavation of the new docks at Grimsby—the core of a horn of *Bos primigenius*. In the peat bed, probably of the same date, which lies below the silt and sand of the Freshney Beck in Aylesby parish, we have dug up bones of the red deer, *Bos longifrons*, wolf, or large dog, wild boar, probably wild cat, and a human *ulna*, like the rest stained perfectly black with the peat.* Below the forest bed is the boulder drift, a reddish clay filled with fragments of chalk and derivative rocks, and varying from 50 to 300 feet in thickness. A peculiarity of the low-lying districts near the sea, as at Tetney and Great Cotes, are the ponds, locally known as 'blow-wells,' popularly supposed to be unfathomable; they are powerful springs, never failing in the driest season, rising from the chalk through the superincumbent drift and alluvium. The blow-wells in the parish of Little Cotes supply the town of Grimsby with an unfailing source of pure water. Many of the low-country springs in the north-east districts are more or less intermittent, the flow of water being regulated by the ebb and flow of the tides. Mr. Clement Reid's recent researches in the north of the county, more especially in connection with the old coast line at the base of the wolds,† and the deposits of inter-glacial sands have added much to the geological interest of the district.‡ The examination of the sand pits at Laceby and Croxton has resulted in the determination of numerous species of marine shells, some yet common on the coast, others slightly northern, but not Arctic, whilst some are indicative of a comparatively warm and equable climate. An interesting find at Croxton is *Corbicula fluminalis*, of which living examples are now restricted to the Nile, the Lake of Gennesareth, and some rivers of Asia.

* The great forest of Kesteven in the south of the county, of which relics remain in Grimsthorpe Park, with its original herd of red deer, probably extended far into Fenland proper. The buried forests beneath the peat comprise oak, elm, birch, Scotch fir, yew, hazel, sallow, alder, and willow. Some of the oaks are of immense size, and the wood, a specimen of which is now before me, nearly as black and hard as ebony. Years after the drainage of the West Fen the exact position of the great trees was made apparent to the fenmen by the rime frost lying longer above them than on the surrounding fen.

† At this period the coast of Lincolnshire was represented by a chain of low-lying islands of chalk, separated by narrow and deep fiords.

‡ 'The Geology of Holderness, and the adjoining parts of Yorkshire and Lincolnshire.' *Memoirs of the Geographical Survey*, 1885. Clement Reid.

This shell is extremely abundant at Kelsey Hill ballast pits, north of the Humber, in conjunction with bones of bison, leptorhine rhinoceros, and elephant. A narrow band of red chalk known as the Hunstanton red chalk is traceable all through Lincolnshire from Gunby to South Ferriby. The summit of the wold near Pelham's Pillar is 456 feet above sea-level; the highest point is probably near Normanby clump, about 549 feet. On the western slope of the wolds below Caistor, and running south, there are a series of ironstones, sandstones, and clays to which the term Neocomian has been applied.

Still following the sectional line we find the Kimmeridge clay represented in a narrow band, estimated at 600 feet in thickness; then in succession Oxford clay and Kellaway rocks, passing into the cornbrash and great oolites, forming an elevated belt of varying breadth through the length of the county. The Liassic clays and marlstones are defined by a narrow belt ten to twelve miles wide in the south, and running off to a mile in width near the Humber. Lastly, on the slopes of the Trent Valley are the oldest rocks in the county, the Keuper sandstone.

Up to the present date Lincolnshire compares unfavourably with other counties * in having no published list of the Mammalia found within its bounds. The last and most interesting addition to the fauna was the wild cat *(Felis catus)* shot in the early part of March, 1883, in a small plantation close to Bullington Wood, near Wragby. † The marten is sparingly distributed in the chain of great woodlands which extends from Wragby to Bourn, and from information recently acquired, we are inclined to think it will be many years before it becomes extinct. The polecat is common; the otter still lingers in the north and south; the badger probably more abundant than in any of the midland counties. The common seal is frequently seen on the coast in the autumn, and on that labyrinth of great sandbanks in the Wash, between Lynn and Wainfleet—of which some, like the Dogshead and Knock, and Seal's Bank, are only covered at high spring tides—there has been

* The list of Yorkshire Mammalia, in Clarke and Roebuck's *Vertebrata*, includes forty-five species out of a possible sixty-nine. In Mr. T. Southwell's list for the county of Norfolk, altogether forty-one species are named.

† For a detailed account of the capture see *The Naturalist*, Sept. 1884, p. 33; *Zoologist*, Sept. 1884, pp. 360-1; Transactions of the Norfolk and Norwich Naturalists' Society, Vol. III., p. 676a.

from time immemorial a considerable colony, and doubtless many young are born in the course of the season. The grey seal is also found in the same locality, and with Mr. T. Southwell, of Norwich,* remains the credit of adding this interesting species to the respective faunas of the two counties.† Of the smaller mammals the dormouse is found in the south-west of the county; ‡ the harvest-mouse is rare, the lesser shrew local, and the water shrew exceedingly plentiful.

Lincolnshire in the present day can boast of little of its former ornithological pre-eminence; it was truly described by Fuller in his day as 'the aviary of England, for the wild-foule therein: remarkable for their Plenty—Variety—Deliciousnesse.' § Few and fragmentary are the records which have come down to us concerning the treasures of the fens in the Liber Eliensis,‖ the Chronicles of Crowland,¶ and from William of Malmesbury** and Camden,†† and again more recently in the writings of Gough,‡‡ Pennant, and Colonel Montagu. Drayton also in quaint verse §§ describes the goodly fens and their teeming life. These passages from old writers have frequently been quoted in descriptions of fen scenery, and space will not permit us to do more than allude to them in a general way. A glorious place in its wild natural state was that old fenland before man had come in to bank and drain, and a very paradise to the fowler and fisher were the boggy flats where the 'dark-green alders, and the pale-green reeds stretched for miles round the lagoon, where the coot clanked and the bittern boomed, and the sedge-bird, not content with its own sweet song, mocked the notes of all the birds around, while high overhead hung motionless, hawk beyond hawk, buzzard beyond buzzard, kite beyond kite, as far as the eye could see.'‖‖ Some idea may be formed of the

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* Trans. Norfolk and Norwich Nat. Soc., Vol. III., p. 670.

† We are afraid a similar joint claim cannot be set up in the north of the county in respect to the recent occurrence of Sowerby's whale, *Physeter bidens*, within the estuary of the Humber, cast up on the shore at Spurn Point in the autumn of 1885.

‡ See Mr. G. T. Rope, Range of the Dormouse in England and Wales, *Zool.*, 1885, p. 207.

§ *Worthies of England*, Vol. II., p. 2.

‖ Ed. Stuart, 1848.

¶ Ingulph's *History of Crowland*, Bohn's translation.

** Temp. 1100.

†† Camden's *Britannia*, 1 Ed., 1695.

‡‡ *Op. cit.*, Gough's Ed., 1806, Vol. II, pp. 380-1.

§§ *Polyolbion*, Song 25 (Holland's oration).

‖‖ Kingsley, *Prose idylls—the fens.*

enormous number of wild foul frequenting the fens by the facts as related by Pennant,* that in one year from only ten decoys near Wainfleet 31,200 ducks were sent to London. In these times a flock of wild duck has been observed passing along from the north and north-east into the east fen in a continuous stream for eight hours together.†

With the drainage of the fens the bird-life disappeared. Gone now as habitual residents are the harriers and short-eared owls, the grey geese and ducks, cormorants, grebes, and divers, the bitterns, cranes, spoonbills, and storks; gone also are the smaller fowl—the black-tailed godwit, the avosets, ruffs and reeves, gulls and terns.‡ Vanished too has many a fen plant, as the great fen ragwort, the giant cineraria and marsh sow-thistle, whilst others like the fragrant bog-myrtle, water germander, and the marsh and royal ferns manage just to retain a precarious footing, and are probably sooner or later doomed to extinction; and with the lost plants—and mainly perhaps from that cause—have disappeared many beautiful insects. The great copper and swallow-tailed butterflies, the red wainscot, rosy-marsh, red-leopard, and Whittlesea ermine moths, and many another insect treasure too numerous to mention; gone too are the myriad frogs, the 'Lincolnshire nightingales,' whose night croakings well nigh drowned all other sounds of fen-life.

Scarcely second to the fens in interest were the vast swamps and wastes of the Isle of Axholme, which as late as the commencement of the present century still swarmed with various fowl. Mr. Stonehouse has left some interesting notes § in connection with the avifauna of this little known district, having reference to the nesting of the marsh harrier, the nesting habits of the bittern, and the taking of ruffs; he also says 'the gyr-falcon is sometimes seen sailing over this and the adjacent wastes; it boldly attacks the largest of the feathered race; the stork, the heron, and the crane are easy vicitims;

* *British Zoology*, Ed. 1768, p. 486.

† In one of the only two existing decoys worked in Lincolnshire, that of Ashby near the Trent, an average of 2,741 ducks, teal, and widgeon, with some others, were captured between the years 1874 and 1867; and since this 6,351 have been taken in a single season, and of these 2,300 in thirty-one days, but in late years the annual take appears to have somewhat fallen off.

‡ It is satisfactory to know that for the last four or five years the black tern has nested in Lincolnshire.

§ *The History and Topography of the Isle of Axholme*, by the Rev. W. B. Stonehouse, M.A., 1839.

it kills hares by darting directly upon them.'* In the time of James I. a great herd of red deer wandered over Hatfield levels and the adjacent wastes of Lindholme, and in the inquisition of 1607 it is said that the number amounted to about 1,000 head, and that the herd is much impaired by the depredations of the borderers. From a curious entry preserved in the parish registers of Finningley in 1737, it is probable that some of the herd remained down to the commencement of the 18th century.

In the first twenty years of the present century, ruffs and reeves were common in all the maritime marshes in the north-east of the county, and we have been assured by an old sportsman that he used regularly to make excursions into the Stallingborough and Immingham marshes in the spring to shoot ruffs and dotterel; a friend also recently told us that he had heard his grandfather, who was a great shooter, talk of seeing the bank between Clee and Tetney in the spring covered with ruffs and reeves, and so tired with their long flight that you might almost knock them down with a stick, and that he could soon shoot as many as he could carry.

On the same coast and salt-fitties at that time came regularly to nest great numbers of oyster-catchers, Arctic, common and lesser terns, and the ringed plover; the sheld-duck also in the sandhills and warrens, and in the adjoining marsh the hen harrier, spotted crake, ruffs and reeves, snipe, and redshank; still further inland, in the woods skirting the wolds, the kite,† buzzard, and hobby. These were the days before the gamekeeper and the trapper were known, and sportsmen were well content with moderate bags, shot over dogs, and with much healthy exercise.

All testimony proves the former abundance of birds in Lincolnshire, and we only know of one exception to this. William Cobbett, who died in 1835, in his 'Rural Rides,' which extended almost over the whole of England, coming to Horncastle, says: 'There is one deficiency, and that with me is a great one, throughout this county of corn and grass and oxen and sheep that I have come over during the last three

* In an old map MDCXXVI. of the Isle, before the drainage by Vermuyden, Storkcarre's are marked between Haxey and Wroote, on the east bank of the river Idle (Idille).

† The eggs of the last kite recorded as nesting in Lincolnshire were taken from a nest in Bullington Wood, near Wragby, in the spring of 1870. Since this time it has only occurred as an immigrant passing south in the autumn.

weeks, the want of singing birds. We are now just in the season when they sing most. Here in all this country I have seen and heard only about four skylarks, and not one other bird of any description; and of small birds that do not sing I have seen only one yellow-hammer, and it was perched on the rail of the pound between Boston and Sibsey.' Had he passed through the same district in the autumn, when the great wave of migration has set in, he would have probably written differently, seeing the fields swarming with larks, chaffinches, and buntings, the hedgerows alive with blackbirds, thrushes, and redwings, and in the marshes, near the coast, immense flocks of snow buntings, tree sparrows, linnets, and twites, as well as hundreds of that characteristic bird of the county the grey crow; on the coast itself such flights of knot, godwit, and grey plover as can be seen nowhere else in England.

The fresh-water fisheries of Lincolnshire had a great reputation, more especially for pike and eels; enormous numbers of the latter were annually taken, and they formed no small part of the tribute and endowments of the monasteries and religious houses. The fen eels often grew to an enormous size—two are mentioned by Yarrell, taken in draining a fen dike, near Wisbeach, one of which weighed 27 lbs., the other 25 lbs.* The pike is plentiful in the rivers and drains of the fens; there is an old adage which says

> Witham Pike
> England has neen like;

and another,

> Ankholme eels and Witham Pike,
> In all England are nane syke.

The pike of the Witham, however, in the present day will bear no comparison with the monsters of the old fen meres, as we may judge from the jaws of this fish found in the peat and preserved in the Cambridge Museum. In the collection of the late Mr. Frank Buckland was a pike weighing over 100 lbs., taken when Whittlesea mere was drained. Valuable salmon fisheries were worked at the beginning of this century on the Humber. Sir Charles Anderson† states: 'In 1806, John Barrick of Barrow, gamekeeper, stated that his father rented the fishery of Barrow, and that thirty years ago he was present at the taking of eighteen salmon in one tide, one weighed 47

* We recently obtained one of four large eels, *Anguilla acutirostris*, caught in a trawl net at sea some miles east of Flamborough Head.

† *The Lincoln Pocket Guide*, p. 85.

lbs., another 46 lbs., the remainder from 18 to 20lbs. each, and sold at 6d. per lb.; at Killingholme 100 salmon were caught in one tide.' That curious fish the burbolt, a freshwater cod, is common in the Trent and other rivers; the barbel also is plentiful, and grows to a large size; we have known six taken with a line and rod in a little over the hour, the collective weight of which was 42½ lbs.

There are districts in Lincolnshire which require careful and scientific examination before we can form a correct estimate of the existing fauna and flora. Such are the low-lying flats and warp islands at the junction of the Trent, Ouse, and Humber, where the Avoset nested as recently as about 1840,* and the ruff in 1871. Then there are the commons and warrens in the north-west, near the Trent, the habitat of many rare and interesting plants which thus far have escaped the ban of cultivation. Here also nest, or have recently nested, the hen-harrier and short-eared owl, sheld-duck, shoveller, teal, and wild duck, stone curlew, ruff, redshank, snipe, dunlin, and little grebe; and at Twigmoor, as well as at Manton Common, thousands of black-headed gulls. The great woodlands from Wragby southward to Bourn, and about Horncastle, the last haunt of the wild cat, pine marten, and kite, would well repay a close investigation; also the fenny flats at the head of the Wash, and the estuary itself, the home of the seal, and in the autumn and winter still the chosen retreat of innumerable wild fowl; here too in the summer we have seen flights of various waders and scoter, which from some cause or other have not joined in the spring migration of their fellows to breeding grounds fifteen hundred miles away within the Arctic circle.

Of the present aspect of the shire, its rich fertility and picturesque scenery we have said little; let such as care to estimate its agricultural wealth follow the wold road from Barton-on-Humber, above Caistor, and through Tealby and Market Stainton to Horncastle, at the season when the wide expanse of the hill country is ripening to the harvest. View the unbounding prospect just south of Pelham's Pillar, first northward across the continuous range of the Limber and Brocklesby Woods, and south-east over the rolling uplands to beyond Croxby and Binbrooke, every yard of which is in the highest cultivation, under corn, turnips, and artificial grasses

* *Handbook of Yorkshire Vertebrata*, Clarke and Roebuck, p. 72.

and clover. What perhaps most strikes the observer is the absence of houses or farmsteads, for the wold villages as a rule lie hid away in hollows of the hills or along the main lines of traffic through the valleys, and at the best it is even now a thinly populated district compared with the rest of the county. North-east towards the Humber the wold breaks away through the Gap (the scene of a sharp cavalry skirmish between a detachment of the Newark garrison and the Parliamentarian horse), beyond the ancient oak and beech of Riby Park and pleasant Aylesby, of shorthorn fame, with the fertile middle marsh merging into the rich pastures of the maritime plain; there softened by distance, rises the graceful water tower, 300 feet high, towering above the blue smoke haze of Grimsby like a Florentile campanile, and marking the entrance to the Royal Dock; beyond this the broad estuary of the river, Spurn Point and Dimlington high land, and on the outmost verge the silver sheen of the North Sea. Turning south, where the wold dips steeply to the central plain, we see the red-tiled houses and grey church tower of Caistor nestling in a hollow of the hills, with half the county spread out like a map, field succeeding field, with infinite shades of yellow, brown, and green, mingled with pinewood, coppice, and hedgerow timber, league beyond league to where on the blue horizon, like a great rock, rises the stately pile of Remigius—Lincoln Minster. All honour to the great Lord Yarborough, great great grandfather to the present earl, who with a lavish expenditure, and aided by an enterprising tenantry, changed the barren wastes into the garden of England, and who, as the inscription on the pillar in the neighbouring wood states, between 1787 and 1823 planted 12,552,700 trees on his estates.

Take again the view from the heath road south of Lincoln, above Boothby-Graffoe, looking west across Somerton Castle and the level district round Newark to the furthest bounds of Nottinghamshire; southward in one broad curve sweeps the wooded escarpment, mile beyond mile to Grantham, the graceful spires of frequent churches marking the position of each cliff village, till the oolite cliff becomes merged into that lias ridge from which the lordly towers of Belvoir overlook the wide vale of Trent. Still keeping our position, but facing eastward, we overlook the breadth of Lincoln Heath, where the finest barley is grown and the largest sheep are reared. In the foreground Dunstan Pillar, a lighthouse on land, built in

1751, to guide travellers over the heath. Beyond the woods of Blankney rises at the edge of the fen, the massive square of Tattershall Castle, built by Lord Cromwell, Treasurer to Henry VIII.; and still following the same direction, that slight-looking column on the skyline is Boston 'stump,' overlooking the never-ending fen.

Again, drive from Spalding to Boston in the latter part of August, along one of those long, straight fen roads, bordered with pollard willow and flanked by wide drains; from each reed-bed comes the rattling song of the sedge warbler, and here the reed-wren suspends her nest; the white or yellow cups of water lilies float on the peat-stained dike, and beneath the shadow of their rounded leaves we detect close-packed shoals of roach. On each side ripening sheets of corn extend to the horizon, or long rows of closely-placed 'stooks' stand in serried ranks like the encampment of an army—nowhere else in England can we see oats and wheat with such length of straw and size of head; then there are beanfields where each stalk is suggestive of that climbed by Jack in his search for the Giant's home; stretches of golden mustard, now in full flower; fields of dark-green swedes or light-green mangolds, of which each root would not disgrace the stall of the seedsman in the Agricultural Hall. Mighty oxen browse lazily the rich pastures, dotted too with big Lincoln wethers, whose recently shorn fleeces weigh from ten to even twenty pounds. From every side comes the sound of busy labour—the noisy rattle of the reaping machines, creaking of the laden wains, and the rustle of sheaves as they are pitched on the load; and all this under a sky which for intensity of blue and freedom from coal smoke, might compare with that of Southern Europe. Seeing all this, we may well exclaim with Cobbett that 'everything taken together, here in Lincolnshire are more good things than man could have had the conscience to ask of God.'

NOTES ON THE ICE-BORNE BLOCKS OF SHAP GRANITE, &c., FOUND IN LINCOLNSHIRE.

By THOMAS SHEPPARD,

Hon. Secretary to Hull Scientific and Field Naturalists' Club, and Member of the Glacialists' Association.

WHILST examining the erratics in the vicinity of Barton for the newly-formed Lincolnshire Boulder Committee, I found a boulder of Shap Granite, measuring 2 feet 6 inches by 1 foot 3 inches, by 1 foot +. This was at the foot of a gatepost at the entrance to Mr. Milson's mill, near the top of the hill just outside Barton, on the South Ferriby Road. The granite in question was well rounded and thoroughly embedded in the ground, so that its precise dimensions could not be ascertained. Owing to its long exposure to the atmosphere the upper part is weathered, the large pink felspars being very prominent. It was in its present position when Mr. Milson took charge of the place several years ago, and I have no doubt it came originally from the boulder clay which occurs in the neighbourhood, though up to the present I have been unable to get any definite information on the point. So far as I can learn, this is the first boulder of Shap Granite recorded for Lincolnshire.

A few weeks later, when walking along the Humber bank between South Ferriby Hall and the Chalk Pit, I was fortunate enough to find a small pebble of the same rock *in the Boulder Clay* at a depth of eighteen feet. I have this pebble before me as I write. Though small, it is a very good sample, and there is no doubt whatever that it is Shap Granite. The characteristic felspars are exceptionally well shown, and, though the pebble is only an inch and a half long, there are portions of no less than four porphyritic crystals of felspar thereon, one of them showing the 'twinning.' This specimen, it should be noted, was found in the clay only about two miles from the previously mentioned boulder.

There are two Boulder Clays in the cliff between Ferriby Chalk Pit and the Hall. The lower one, which is only a thin deposit, is of a dark colour, is very compact, and contains a fair quantity of boulders of different sorts, including rhomb-porphyry and others of Scandinavian origin.* The upper clay, however, is of a totally different character. It attains a thickness of about 20 feet in its highest part, which is near the centre of the cliffs, and gradually thins out towards the east and west. It resembles the 'Hessle' clay of Wood and Rome,† being of a very red colour, blue-jointed in places, and containing only a few pebbles (including rhomb-porphyry). Large boulders are only rarely found in this upper clay. In both deposits pebbles, generally of carboniferous limestone, are often found beautifully ice-scratched, and sometimes even polished.

On the opposite side of the Humber, at North Ferriby, is a precisely similar deposit, about the same size as the bed at South Ferriby, containing similar boulders (though in far greater number and variety), and composed of similar beds of Boulder Clay, etc. These sections have recently been fully described by Mr. J. W. Stather, F.G.S.‡ Both Mr. Stather and the writer have found boulders of Shap Granite here.

The Rev. W. Tuckwell tells me he has lately found a block of Shap Granite measuring 1 foot by 1 foot, by 1 foot 6 inches,§ at Irby, near Laceby, North Lincolnshire. It was 'taken out of an old Saxon wall,' and is 'hollowed into quern-like depressions on three sides.' Of course there is no knowing from where this boulder may have been carted, along with other stones, to build the wall with.

Later still, Mr. J. H. Cooke, B.Sc., F.G.S., has found two or three boulders of this Granite at Goxhill.

Mr. Clement Reid, F.G.S., in his 'Geology of Holderness,' 1885, page 35, refers to a boulder of Shap Granite which he found on the beach near Dimlington, and which up to that time was 'the furthest point to the south-east to which Shap Granite had yet been traced.' Later, Mr. John Cordeaux

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* For a list of the various rocks of Scandinavian origin found in Lincolnshire, see the list which accompanies my paper 'On the Occurrence of Scandinavian boulders in England' (*Glac. Mag.*, vol. iii., 1895, p. 129).

† Quart. Journ. Geol. Soc., vol. xxiv., p. 146.

‡ In a paper read to the Yorks. Geol. Soc. at Whitby, July, 1896.

§ 1st Rept. Linc. Boulder Committee, *Naturalist* for November, 1896.

records a boulder of this rock at Kilnsea near Spurn.* This is now in the garden of Mr. H. B. Hewetson, at Easington.

Inland, at Royston near Barnsley, which is just south of the line of the Humber, this granite has been found,† and Messrs. Corbett and Kendall report a boulder at Balby near Doncaster;‡ this and the Barton, South Ferriby, Irby, and Goxhill specimens described above, are the only records that I know of for the country immediately south of the Humber.

Whilst in the quarries at Wasdale Crag in Westmorland last Easter (it is from this place that all the boulders of Shap Granite have originally travelled) I obtained a quantity of hand specimens of the rock, and shall be very pleased indeed to send a piece to anyone in Lincolnshire interested in the subject, who is unacquainted with the rock, in the hopes that a constant look-out may be made for 'Shaps.' I feel confident that many other boulders of this granite will be found in Lincolnshire—they only require looking for. The rock cannot very well be mistaken, it is a 'pepper-and-salt'-looking granite, of a pinkish colour, containing large rectangular crystals of flesh-coloured felspar, which vary from an inch to an inch and a half in length, and are about half as wide. The matrix consists of minute crystals of colourless quartz, pink felspars and black mica, together with other minerals. There is also a whitish variety of the same rock, the ground-mass in this case containing several small specks of white felspar, which give it a generally whiter aspect. This granite has recently formed the subject of an exhaustive paper by Messrs. Harker and Marr.§

(*To be continued*).

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* *The Naturalist*, 1889, p. 355.

† *Mackintosh. Geol. Mag.*, 1871, p. 312.

‡ Report of Brit. Assn. Committee on Erratic Blocks, 1896.

§ Quart. Journ. Geol. Soc., 1891, pp. 266-328.

NOTES ON THE ICE-BORNE BLOCKS OF SHAP-GRANITE, &c., FOUND IN LINCOLNSHIRE

(concluded).

By THOMAS SHEPPARD,

Hon. Secretary to Hull Scientific and Field Naturalists' Club, and Member of the Glacialists' Association.

I SHOULD here like to say a few words respecting the Lincolnshire Boulder Committee. It was with very great pleasure that I read in Part I. of the Transactions of the Lincolnshire Naturalists' Union, the Presidential address of Mr. J. Cordeaux, M.B.O.U., in which he proposed (p. 7) that a Boulder Committee should be formed whose object would be 'to take observations relative to the erratic or ice-borne blocks of Lincolnshire, their character, position, size, origin and height above the sea. This to be carried out on the same lines generally as those adopted by the Boulder Committee of the British Association.' It is also gratifying to learn that this suggestion has been carried out, the Committee consisting of the following gentlemen:—The Rev. W. Tuckwell (Secretary), and Messrs. F. M. Burton, J. H. Cook, H. Preston, A. W. Rowe, E. A. Woodruffe-Peacock and P. F. Kendall. Though only in existence a very short period, a large amount of good work has already been done. Mr. Tuckwell has put on record particulars of a quantity of boulders (including some Norwegian) obtained from a depth of over ten feet at Grimsby,* and during the past summer the Hull Geological Society and the writer have sent particulars of a large number of erratics which have been observed at different places in the county, to the Committee. In May last the Hull Society made an excursion in the Louth neighbourhood, when Mr. Tuckwell, Mr. Kendall (the Secretary of Brit. Assn. Erratic

* 23rd Report Brit. Assn. Erratic Blocks Committee, 1895.

Blocks Committee), and others were also present. On this occasion everybody was surprised at the large quantity of boulders and rocks of foreign origin that were found on and in the Boulder Clay of the district. In front of the entrance to Thorp Hall, just outside Louth, on the Lincoln Road, was a boulder of Augite-syenite, a characteristic Norwegian rock, measuring 2 feet by 1 foot 8 inches, by 1 foot 5 inches, which still retained the scratches inflicted upon it by the ice during the 'Glacial Period.' Up to the time of writing, this is one of the largest boulders of Augite-syenite recorded for Britain, if not the largest. Steps are being taken by Captain Tennyson, the owner of Thorp Hall, to preserve this boulder.

There is another Norwegian rock which was found in plenty in the Boulder Clays, viz., Rhomb-porphyry. This is so called on account of the large rhomb-shaped crystals of felspar (orthoclase), which are embedded in a fine-grained matrix, which varies in colour from slaty green to purple or brown. These 'rhombs' are especially striking on a water-worn surface.

From these numerous finds it would appear that there is a splendid field open for persons having a geological inclination who are fortunate enough to live in the 'second largest county of England.' So far as I am concerned, I shall be glad at any time to render what services I can, and if any of our Lincolnshire friends would care to have specimens of the commoner of the Norwegian rocks, I shall be only too pleased to have the opportunity of supplying them. Mr. Tuckwell, the Secretary of the Boulder Committee, would, I am sure, answer any inquiries respecting the boulders of his county, or receive any information respecting the erratics of any part of Lincolnshire.

With regard to the manner in which the various far-travelled stones have reached their present positions, the following is the view generally accepted by those geologists who make a special study of the subject.

During the last of the series of great geological events, viz., the 'Glacial Period,' the climate gradually grew colder and colder, and the snow accumulated on the great hill-centres of the Northern Hemisphere, and probably of the whole world. The cause of this it is not necessary at the present moment to discuss.*

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* The subject has been fully dealt with by Mr. P. F. Kendall, F.G.S., in 'The Cause of an Ice Age.' *Trans. Leeds Geol. Assn.*, part viii., 1893.

As the accumulated snow was in excess of the quantity annually melted, glaciers began to descend, first of all into the Irish Sea from all sides, namely, North Wales, Ireland, the Clyde, and the English Lake District; and into the North and Baltic Seas from the Scandinavian Mountains. Year after year, the glaciers increased in magnitude, and the ice flowing into the Irish Sea (which is only, comparatively speaking, very shallow) coalesced, entirely excluding the water,* and finally diverted the ice from the Lake District over the Upper Stainmoor Pass into Teesdale, down which it flowed towards the North Sea.

In the meantime the ice from the Scandinavian Mountains, advancing in a huge sheet (which would resemble the Greenland Ice-cap of the present day), encroached upon the waters of the North Sea,† and, after reaching our shores, the two glaciers flowed down the east coast. The Norse ice brought with it the boulders of rhomb-porphyry, augite-syenite, etc., while the Teesdale glacier carried the boulders of Shap Granite, 'Brockram,' and other Lake District rocks, together with boulders of carboniferous limestone from the sides of Teesdale itself. It was at this stage, when the Scandinavian arrested the progress of the Teesdale ice, that the bulk of the latter glacier was diverted down the Vale of York and formed the beautiful crescentric mounds around York, which have been so lucidly described by Mr. Kendall.‡ These mounds are terminal moraines.

The Boulder Clays of Yorkshire and Lincolnshire, therefore, not only mark the area covered by the ice, but contain boulders which help to indicate the direction the ice took.§

The Norwegian ice-sheet, as might be expected, laid down a moraine, and this, a line of gravel hills, extends from Flamborough Head into Lincolnshire, crossing the Humber at Paull. During the many oscillations of the ice front the moraine was over-ridden—perhaps on two or three occasions.

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* We have proof that it covered Snæ Fell (2,034 feet), the highest peak in the Isle of Man. Kendall, 'On the Glacial Geology of the Isle of Man.' *Yn. Lioar Manninagh*, 1894.

† The bed of the North Sea, like that of the Irish Sea, is exceedingly shallow.

‡ The Glaciation of Yorkshire. *Proc. Yorks. Geol. Soc.*, 1893. See also Mr. C. Fox Strangways' paper in Proceedings of the same Society for 1895.

§ Mr. Fox Strangways' paper (just referred to) is accompanied by an excellent map showing the drift-covered area of Yorkshire, and a similar map appears with Mr. A. Jukes-Browne's paper in *Quart. Journ. Geol. Soc.* for May, 1885, p. 115, indicating the range of the Boulder Clays in the county of Lincoln.

In addition to the great moraine just mentioned there is a smaller, though none the less interesting one, a few miles to the west of this large one. This moraine (for such it is) crossed the Humber at North and South Ferriby, the Boulder Clay cliffs on either side of that estuary being all that is left of a bank of glacier débris that once existed right across the river, which would no doubt at some time interfere with its drainage. It was in this moraine, at a depth of eighteen feet, that the pebble of Shap Granite referred to at the beginning of this paper was obtained.

It should here be remarked that whilst 'boulder-searching' during the past summer I found a piece of chalk thoroughly embedded in the chalky rubble on which the bank of boulder clay rests at South Ferriby, which was beautifully ice-scratched, the striations thereon indicating that, if striated in its present position, the ice which made them came from a north-easterly direction.

The foregoing remarks may perhaps appear to be a rather roundabout way of explaining the transportation of the boulders in East Yorkshire and Lincolnshire, but it must be borne in mind that were it not for the fact that the Irish Sea was filled with ice to overflowing, thus causing the Lake District ice to find its way into the North Sea, to be afterwards dragged down by the Norwegian ice-sheet, we should not have had the pleasure of finding Shap Granite in Lincolnshire!

The whole subject is so full of interest that one could say much more, but I feel I have already trespassed too much on valuable space. However, I have endeavoured to show that simply recording 'erratics' is not uninteresting, and it is such *facts* as these that we must have in order to solve the complex glacial problems that are occupying the attention of so many of the geologists of to-day. No matter what theory may be advanced in order to explain the presence of these boulders, the records of the boulders themselves must be first taken into consideration.

In conclusion, I sincerely hope that an earnest effort will be made, by all who are able, to help the Lincolnshire Boulder Committee in their work. The Yorkshire Boulder Committee has now been in existence some ten years, and has each year printed most valuable reports, though the county is far from being 'worked out' yet.

The 'East Riding' Boulder Committee, which report to the Yorkshire Boulder Committee, has divided the area under

its supervision into mile squares, each member taking one or more of these squares and reporting *all* the large boulders occurring in the area allotted to him. By this means a systematic record is being made, and though we can hardly expect our few, too few, fellow-workers in Lincolnshire to adopt the same course just yet, it is to be hoped this method will be carried out in time to come.

Unlike the other sections of the Lincolnshire Naturalists' Union, the Geologists are able to pursue their field-work, and with good result too, during the winter months. In fact, for boulder recording, wet weather is decidedly preferable, as the rocks show off to far greater advantage when wet, and can thus be identified with much greater ease. We need only go into one of the numerous 'cobble'-paved yards that abound in districts where Boulder Clay occurs (the 'cobbles' being generally obtained from the clay) to see this. In dry weather they all appear to be of similar composition, but as soon as they have been thoroughly cleaned with rain, it is quite surprising what a variety of granites, porphyrites, schists, limestones, sandstones, etc., can be seen. This variety is also noticeable, though not to such an appreciable extent, among the larger erratics.

Mr. J. Lomas, speaking of striated surfaces in the Liverpool district, says—'It is worth remarking that the striæ *more thickly congregate in places where geologists reside.*'* Let us hope that our Lincolnshire boulder reports will shortly show a similar result.

AN ARCHÆOLOGICAL HISTORY OF THE WASH.

By GEO. SILLS,

of St. John's College, Cambridge, M.A., and of Lincoln's Inn, Barrister-at-Law.

THERE are few subjects of greater interest than the change which in the course of ages has taken place in our lakes and rivers. To take one or two instances: The Thames was formerly an estuary, the remains of which

* *Glacialists' Magazine*, vol. iii., 1895, p. 21.

may still be seen in the Essex marshes. The various places situate in the bed of the estuary still bear the names of islands. Thus, we have Moles*ey*, Chesil*ea* (now Chelsea), Put*ney*, Batters*ea*, Bermonds*ea*, Pits*ea*, &c., &c. The street called "The Strand" took its name from being the strand, or, as we should say, "the beach" of the estuary, although it is now half a mile from the present course of the river.

Lewes was formerly on an estuary, and the marks of the tide may still be seen on the neighbouring hills. Between there and the sea are the islands of Horse*ye*, Hind*nea*, Lang*ney*, Peven*sey*, &c., &c., now surrounded by dry land.

Norwich was formerly a seaport town, and remained so until the sea was kept out by the bar called Yarmouth, *i.e.* Yaremouth.

Sedgemoor was formerly a large inland lake, in proof of which it is enough to say that every place in it is called an island, although for many years past surrounded by dry land.

I propose in this article to show the history and change in the Wash, and that Lincoln was formerly a seaport town, that is to say, that it was situated on the Wash, which is now about 30 miles off.

In considering this question it is all-important to show what the Wash was, and how far it extended.

This subject has already been considered by the Rev. Canon Taylor in his *Words and Places*, and he comes to the conclusion that the Wash was formerly six times as large as it now is, and in my judgment he has rather understated than overstated the case.

Let us take the present fen country and marshland, bounded on the east by the highlands of Norfolk and Cambridge, on the south by the counties of Huntingdon and Northampton, and on the West by the highlands of Huntingdon, Northampton and Lincoln counties, and on the north by the highlands of Lincolnshire, and we find that with the exception of two bars or deltas, which I will presently mention, every place is called an island.

Among other places, too numerous to mention, may be noticed in Lincolnshire—Stick*ney*, Frisk*ney*, Sibs*ey*, Ged*ney*, Souther*ey*, Bard*ney*; in Northamptonshire—*Eye*, Ox*nea*; in Cambridgeshire, Man*ea*, Thor*ney*, Whittles*ey*, Ely *i.e.* Eele*ye*; in Huntingdonshire—Rams*ey*, Sawtr*ey*, Swathes*ey*.

The terminals *ey*, *ea*, *eye*, are Saxon names for islands; while *nea* and *ney* are Scandinavian, or, as we now say,

"Danish" terminals. The Saxons seem to have used their terminals for any island, whether surrounded by the sea or by fresh water.

The Danes, however, used the terminals *nea* and *ney* to signify land surrounded by the sea. Their word for an island surrounded by fresh water was *holme*.

It must not be forgotten that the invasion of this country by the Saxons and Danes were as follows:—

The Jutes about A.D. 449.

The Saxons about A.D. 477 to 495.

The Danes about 790 to A.D. 1013.

The names of those islands were therefore given not earlier than A.D. 449 or later than A.D. 1013, and the importance of that question consists in the fact that in those times the places in question were islands surrounded by the sea.

While I am dealing with the names of places, I may here mention two "bars" or "deltas" which exist in the Wash, one starting at King's Lynn and running due east to Spalding, and then running due north from Spalding and ending at Sibsey and Wainfleet; and the other starting at Skegness and running due north to Great Grimsby.

I may dismiss the latter at once by saying that it is formed by the sandhills which are blown up from the bed of the Wash and so keep out the sea, and it has no bearing on my subject.

The former is however of vital importance.

In order to deal with this part of my subject, I may mention that the sea flows up every tidal stream twice in about every 26 hours. At every influx of the sea, a time comes when the fresh water running to the sea and the sea water in the river are *in equilibrio*. When that event happens, the solid matter held in solution instantly begins to sink to the bottom, the heavier particles first and the lighter ones afterwards. As this usually happens about the same place, a bar gradually forms which in time becomes a "delta."

These deltas are sometimes so important that cities are built upon them, *e.g.* Calcutta, at the mouth of the Ganges.

Into the south and west sides of the Wash an unusual number of rivers flow—the Ouse, the Cam, the Nene, the Welland, the Glen, the Guash, the Slea, the Witham, and the Bain, flow within a short distance either directly into the Wash or into rivers which flow there, the result of which has been that the Wash has for many thousands of years been gradually silted up; and, as the rivers have been gradually

trained out to sea in definite channels, the bar or delta in question has been formed.

If we take the names of places, we shall see the rapidity with which this bar has been formed.

The place called "Lynn" bears a Celtic name, and means "deep water." In other words, King's Lynn occupies a place which in the time of the Celts was deep water. Part of the deep water is still left, and is to be found at "Lynn Deeps."

"Gedney" is compounded of two Danish words "Ged," a pike; and "Nea," an island surrounded by the sea. This name could not have been given earlier than A.D. 790, when the Danes first invaded us, and it suffices to say that at that time the bar in question had not been sufficiently formed to prevent the sea flowing from the present Wash past Gedney and up to Ely and Cambridge; while, when Lynn was deep water, it seems probable that the bar had not even begun to be formed, nor is it likely that it had begun, for at that time the rivers in question did not reach so far, but entered the Wash many miles away. To proceed with the names of places, Wisbeach means the "Ouse beach," though its position is so far changed that the "beach" is now at least 20 miles away.

Holbeach means the "beach in the hole," but that place is 16 miles from the sea.

The tide no longer flows to Tydd, *i.e.* Tide, or within many miles of it.

Moulton Seas End is now 8 miles from the sea.

Turning from Spalding northward, anyone driving from Gosberton Risgate to Swineshead will see at a distance of 9 or 10 miles from the sea the small hills thrown up by the waves with the marks of the tides still upon them.

In Keble's *Reports*, A.D. 1685, a case is reported thus:—

"*Parte lessee of Sir H. Herm v. Brownlow*, in ejectment of a marsh the Plaintiff claimed as parcel of the manor of Cressy Hall, the Defendant as parcel of the Manor of Newburgh in Surfleet; but it appeared to be a marsh in common to two vills, between them and their tenants by prescription for sheep, *being salt*. The Plaintiff also claimed as derelict; *but, being overflowed by the sea at springtides*, he was non-suited."

Although in the reign of Charles the 2nd the *locus in quo* was, as appears above, overflowed by the sea, it is now about 12 miles from the sea.

A little farther north is "Bicker Haven," which is now not only dry land, but is many miles from the sea.

If we take the evidence afforded by the names of places, and by the changes of modern times, we have sufficient to show that much less than 2000 years ago the "bar" in question was not in existence, and that at that time the Wash extended from the North Sea to Ely and Cambridge on the south, and on the west over the low-lying country now called the Fens, up to the valley of the Witham, and so up to Lincoln.

This conclusion is fortified by history.

The Romans who stayed with us from about 55 B.C. to 420 A.D. seem to have found the Wash, to which they gave the name of "Metaris Estuarium," in a transition state.

It was evidently rapidly silting up, and the islands which I have previously mentioned were probably being formed. They made the first great effort to convert part of it into dry land by making the "Roman bank," which still exists on the east coast of Lincolnshire, and the deep drain now called the "Cardyke," *i.e.* the dyke in the Fens, parts of which still exist.

As I have previously pointed out, the islands in question were then formed or being formed, and some at least were soon after inhabited, *e.g.* Friskney, the island of the Frisians, Oxnea the Island of Oxen, Eye on which stood the Danish fortress Eyeborough.

At the time of the Conquest the marshes and fens were some of them covered by the sea, though if it is true as told by Kingsley in the *Camp of Refuge* that the waters about Ely teemed with fresh-water fish, the sea at that time had ceased to go so far inland as Ely and Cambridge. This is, however, probably a mistake of the author, for in the 43rd year of Elizabeth an Act was passed to "drain the marshes and other lands commonly subject to surrounding by the sea within *the Isle of Ely* and the counties of Cambridge, Huntingdon, Northampton, Lincoln, and other counties."

This Act was not carried into effect; but in the reign of Charles the 2nd and afterwards the great Bedford Level was drained, which extended into several of the counties above mentioned.

About 60 years ago Whittlesea Mere, a remain of the Wash, was drained.

About the same time Cowbit Wash was drained.

Neither time nor space suffice to detail the various Acts of

Parliament which were passed in the reigns of the Georges and up to the present time providing for the institution of Drainage Commissioners, the draining of the fens and marshes, and the training of the various rivers to the sea; but, I may add that if in the reign of Elizabeth the Isle of Ely was "commonly subject to surrounding by the sea," it is manifest that the sea must even at that time have flowed over most of the fen and marshland, extending from Lincoln past Bardney, Friskney to Spilsby on the north, and past Peterborough to Ely on the South.

Two very interesting questions arise here. The first is—What caused the Wash? This question is best answered by geology. Although the Wash has been in existence, certainly, some thousands of years, and has been gradually reclaimed from the sea, underneath its bed are large forests of well-grown timber trees, for the most part consisting of oak, larch, and fir, though near Crowland there is a large district called "The Alderlands," which receives its name from the fact that wherever digging takes place, alder trees are found beneath the surface.

When it is remembered that oak, larch, and fir will only flourish in fairly dry places, it follows that before the convulsion of nature which sent them beneath the sea they must have existed on high and dry land, and there seems no reason to doubt that the forests in question were situated on land as high as the neighbouring land: while, as the alder will only flourish in damp low places, it follows that the land about Crowland was always low.

What caused the convulsion of nature? When it is borne in mind that all these submarine forests consist of full-grown trees of about the same age, it seems to follow that they were overwhelmed at the same time, and seeing that the land, on which they were, was suddenly lowered so much that the sea flowed over it, nothing but an earthquake could have been the cause.

Geologists tell us that France and England were once joined together, and that the Isle of Wight was once joined to the mainland of Hampshire. Is it too much to suppose that the earthquake which caused that severance was also responsible for the making of the Wash?

The second question to which I have alluded is this—What effect would the formation of the Wash have upon the low lying land between Lincoln and Nottingham, Lincoln and

Leicester, Lincoln and Derby, and what effect would it have upon Lincoln itself?

The earthquake in question made the Wash as a whole within the limits which I have above pointed out; and the "bars" which I have above mentioned and the various islands were made by natural causes in succeeding ages.

At the time of the making of the Wash, the sea would naturally find its own level, and would not only flow to Lincoln but up the valley of the Fosdyke and the Trent to Nottingham, up the valley of the Soar to Leicester, and up the valley of the Derwent to Derby. Even in such comparatively modern times as the incursion of the Danes, this was still so; for history tells us that they used to sail from the North Sea to Lincoln, Nottingham, Derby, Leicester, and Stamford, and that they made those five places their principal "burghs,' *i.e.* fortresses.

The names of the places of the valleys in question all disclose the same state of facts. Thus in the valley of the Witham we have the islands "Bardn*ey*" and Souther-e*a*, or as it is now spelt Southrey; and in Lincoln itself we have the Holmes, *i.e.* the Islands and Carholme, *i.e.* the Island in the Fen. Danish names that were given some time between the years A.D. 790 and A.D. 1013.

Between Lincoln and Nottingham there are the following names of islands, Torks*ey*, Drins*ea* Holme near Markham, Thor*ney*, Broadholm, while only four miles from Nottingham is another "Holme" now called "Home Pierpoint." It may well be asked, "If the Wash formerly flowed past Lincoln and up the Fosdyke valley, how is it that part of Lincoln now stands upon what must have been the bed of the Wash? The question is easily answered. The rivers Brant and Witham flowed into the Wash somewhere about Bassingham or Boultham. According to the well-known law of nature, a bar was being formed probably at Lincoln itself, and this would be further increased by the waters of the Trent and Derwent which at that time must have flowed up the Fosdyke valley.

The Romans found it necessary to carry their Ermine-street across the valley of the Witham; and for that purpose they embanked and dug out a drain up the valley of the Fosdyke, and gave it the Latin name "Fossa," *i.e.* "dug out," "a drain," to which modern times have added the word dyke. They also trained the Witham and the Brant from Bassingham up to Brayford, *i.e.* the "braw" or great ford. They also

made a deep cutting from Boultham along the east side of what is now the High-street called the Sincil Dyke, and two deep cross drains from the Witham to the Sincil Dyke. These works still exist, though of necessity somewhat curtailed in size. By this means they were able to make the present High-street from Canwick common as far as the Wickenford, *i.e.* the ford at the Vicus or village, and the Brayford. The position of the church of St. Mary-le-Wigford or Wickenford, and the fact that New-land was taken out of the Brayford, is abundant evidence that the river at those points was a large stream, and not the puny river that it now is. The fact that there were two fords, one of which divided the Ermine-street, is evidence that the river was too wide for a bridge, and was crossed either by the ford or by boats.

The Fossa or Fossdyke was evidently afterwards continued at least as far as Boston. All this is not mere conjecture, but is fortified by history.

For more than 1000 years after the Romans had gone, the Witham ended at the Brayford in Lincoln.

The historian, Leland, who wrote about A.D. 1550, thus deals with the subject: "The river of Lindis fleateth a little above Lincoln towne and maketh certain pools whereof one is called "Swanne Pool." And again: "There be four ferys *upon the water of Lindis betwixt Lincoln and Boston.* To Shut Fery 5 m. Tatershaul Fery 8 m. To Dogdich Fery 1 m. To Langreth Fery 5 m."

I have lately come across a pleasing ballad by Jean Ingelow called "The High Tide on the coast of Lincolnshire, 1571." In that ballad the river at Boston is called the Lindis, and not the Witham. Thus the authoress speaks of "Reedy Lindis," "the Lindis Flow," "the Lindis raging sped," "Sunny Lindis floweth." The ballad is evidently taken from an older ballad, or from tradition, in either of which events it is important as corroborating Leland.

In Dugdale's *History of the Embanking of the Fens* there is the following account of this locality:

"In the 49th year of Edward the 3rd (the term being then kept at Lincoln) the Jurors of divers Wapentakes in that county did exhibit a Presentment in the Court of King's Bench importing that the channel called the Fosdyke extending itself from the river of Trent at Torksey to the city of Lincoln having been anciently open and full of water so that ships and boats loaded with victual and other vendible commodities did

use to pass to and from Nottingham, York, Kingston-upon-Hull, and sundry other places and counties by the said river of Trent, and so by this channel to Lincoln, and from Lincoln to Boston to the great benefit of the city of Lincoln, and advantage of all tradesmen passing that way, as also of the whole county adjacent was then choked up for want of cleansing and repair."

It will be noticed that the Presentment mentions not only boats but ships, which used to sail from the North Sea to Kingston-upon-Hull, from there to Torksey, and from Torksey to Lincoln and Boston: also, that the Court of King's Bench sat at Lincoln, as indeed it frequently did in the times of the Norman and Plantagenet kings, in whose reigns so many statutes were passed there that they are called "The Statutes of Lincoln" to this day. The Presentment mentions the Fosdyke as extending from Torksey to Lincoln. If that is correct, it would seem to show that the channel from Lincoln to Boston was first made at some time subsequent to the making of the Fosdyke.

The history of the Wash dates back from times long before written history; and even educated persons may draw different conclusions from archæology, the names of places, and the levels of land, which is all we have to go upon in addition to the comparatively modern history that we have to guide us.

It may be useful therefore for me to sum up my argument, which I do thus:—

The existence of forests below the bed of the Wash shows that it was once dry land. The forests consisting of oak, fir, and larch, the land must have been a considerable height above the level of the sea. The trees comprising the submarine forest being full grown and of about the same size, the convulsion of nature which hurled the land below the level of the sea must have taken place at one time, and must have been what we call an earthquake. This earthquake probably took place at the same time as the one that divided England from France. At any rate, it took place long before the date of history, for Lynn, a Celtic word for deep water, shows that the Wash was in existence in Celtic times. When first made, the Wash was, at least, six times as large as it is now, and must have flowed quite up to Lincoln, and the tide must have flowed up to Nottingham, Leicester, Derby, and Stamford. Indeed the name of the place Washingborough, *i.e.* "the Danish tribal fortress on the Wash," is a strong argument that in the time

of the Danes the Wash still flowed up to Lincoln. For many thousands of years the Wash has gradually silted up from natural causes, until it has reached its present dimensions.

So much for the past. As to the future, it is said to be prudent not to prophesy unless you know.

Seeing that, early in the reign of Her Majesty, an Act of Parliament was passed to enable a company of adventurers to enclose the Wash by a bank extending from Lincolnshire to Norfolk, and that they were only stopped from carrying the work into effect by want of funds, and seeing that Nature is taking the matter into its own hands by rapidly silting up the Wash, I think that I may safely prophesy that many of those who do me the honour to read this article will live to see the Wash once more dry land, and the coast of Lincolnshire once more joined to that of Norfolk.

THE STORY OF THE LINCOLN GAP.

THE Presidential Address on this subject, delivered at Lincoln in 1895, and re-published in the Natural History section of *Notes and Queries*, in the October number of last year, is of great and wide-spreading interest. The author's (Mr. J. M. Burton) object is to prove that the Trent once flowed through the gap on which Lincoln is built.

Quoting from Mr. Jukes Brown, he gives several proofs of his assertion, and we cannot but admire the practised manner in which the quarry is scented step by step by means of the ancient gravel deposits found between the great gap in the oolitic escarpment at Lincoln and the river Trent.

Mr. Burton is of opinion that the course of the Trent was changed in pre-glacial times, whilst Mr. Jukes Brown, he tells us, suggests that the change took place in a post-glacial period.

There are reasons to suppose that the view taken by the latter is the more likely one. Some of these I will briefly mention.

I. The village of Holme now consolidated with Langford (both being on the east of the river) formerly went with

N. Muskham which is on the west, and there is evidence that the water or the greater portion of it once flowed between Langford and Holme, and not as it does now between Holme and N. Muskham. Hence the name of Langford may reasonably be supposed to be derived from the "Long ford" which in days of yore had to be crossed in getting from the one to the other of these places.

II. There is still extant what may be called the original or principal bed of the Trent, now known by the name of the "Fleet," being in some parts twenty or thirty yards wide in Langford Lordship, and connected by a narrow neck with the Trent some three miles north of Newark. The Fleet passing through Langford runs hard by the villages of South and North Collingham through Besthorpe where it widens into a fine sheet of water at least 150 yards wide and nearly a mile long, on to Girton, where no doubt in comparatively recent times a narrow channel has been cut almost at right angles to take this water again to the Trent. Before this channel was cut, in all probability, the Fleet, or rather the ancient river, or the greater portion of it, would continue its course through the low lands of Girton to Spalford, whence it would go, as described by Mr. Burton, to "join the Witham a short distance west of Lincoln."

III. This Fleet is about a mile, more or less, from the present bed of the stream, and between them there is a series of pools, apparently beginning at S. Collingham and extending through N. Collingham, Besthorpe, and Girton, like links of a sunken chain floating to the surface one by one at irregular intervals, tracing the course of a central stream. These pools have distinctive names, *e.g.* Cowarth, Mons pool, Black pool, Leech pool, some still possessing considerable depth of water, and some being rapidly silted up, stock now grazing on places which can be remembered as formerly the haunts of the voracious pike.

IV. There is yet another stream to be considered and this is known as the "Old Trent" and runs almost from west to east from that river to Spalford, dividing that hamlet from the parish of S. Clifton. This still contains a good deal of water till it comes within a short distance of the "High Flood Bank," extending from the Spalford sandhills to South Clifton, from ten to fifteen feet high, which was erected no doubt with the object of changing the course of the Trent. Near this spot all these streams met. And here crosses the road from

Newark to Gainsborough, travellers on it being warned by guide-posts "not to pass this way in flood-time." The affix to the name of this hamlet may not unlikely have been derived from the "ford" which had here to be waded. This Flood Bank broke during an unusually high flood nearly a century ago, and then it was clearly seen that the Trent waters if left to themselves would again mingle with those of the Witham, although the old bed of the river was entirely obliterated by the blow-away sand so abundantly provided by that district.

In addition to the above-mentioned High Flood Bank there is the ordinary bank along the side of the Trent, but this river being constantly subject to great floods, this ordinary bank is totally inadequate to prevent nearly the whole of the land lying between the Trent and the Fleet from being submerged —sometimes to such an extent that the writer of these pages has rowed over the highest hedges, and more than once has had to be rowed to Girton Church on Sunday to take his duty there, the churchyard, with the exception of a few feet opposite the usual entrance, being entirely surrounded by the deluge.

In conclusion, it may be added that it is highly probable that when the great bulk of the waters thus flowed to the Witham, the present course of the Trent was also in use. In proof of this it is but necessary to call attention to—

1. The fact that as the water at Girton rises some 6 inches at every high tide, there could have been no *primâ facie* difficulty in some of the superfluous waters of the Trent taking that course.

2. The escarpment of the cliffs at Clifton.

3. The fact that there is also an "Old Trent" at Dunham, some few miles lower down, this Old Trent being on the west side of the river.

4. That several miles still lower down there is a place called Burton Stathers, so called most likely from the "stathers" or piles driven by the side of the bank, either to prevent further corrosion of the river bank—a favourite and well-known pastime of this river—or, which is still more probable, to provide convenient landing for the passengers or freight of boats drawn up alongside.

S. Bateman.

Yarburgh Rectory.

PRESIDENT'S ADDRESS TO THE LINCOLNSHIRE NATURALISTS' UNION, 1896.*

By Rev. CANON W. W. FOWLER, M.A., F.L.S., F.E.S.

IT is usual to estimate the success of any society or union of members, and it must be allowed that, although often misleading, the growth or decrease of the number of members affords a rough method, at all events, for judging of its prosperity and popularity. On December 31st, 1895, the Lincolnshire Naturalists' Union consisted of 76 members. During the present year 31 new members have joined, one has died, one has left the county, one has resigned, and the membership of three has lapsed, owing to non-payment of subscriptions; this leaves the present number at 107 (including twelve life members), so that we show a net increase of nineteen. This, though of course satisfactory, cannot as yet be said to be an adequate representation of the people in this large county who are interested in natural history, and there is no doubt but that the membership might be very largely increased if each of the present members would endeavour to induce his friends to join the Union.

Our obituary is limited to one notice, but by the death of Lord Lilford we have lost an ornithologist of world-wide reputation, whose literary work is of the utmost value to science, and whose ability was only equalled by his kindness and generosity.

It is usually the custom in the addresses of the scientific societies to allude to any important works published during the year which relate to their especial subject, and it seems only right that in our Union we should make allusion to scientific works of any kind in which our members have taken part. We ought, therefore to congratulate Miss Florence Woolward, of Belton, on the conclusion of her great work on the orchids

* Re-published by special permission from *The Naturalist*, 1897, pp. 149–156.

of the genus *Masdevallia*, a group found only in Central and South America, chiefly in mountainous regions and often at a great elevation. The book is especially valuable for the large number of hand-coloured plates (eighty-seven) of the natural size of the plants, lithographed by Miss Woolward, and all drawn by her from nature, with the exception of seven species, of which drawings were sent to her by botanists residing in the country which is the habitat of the plants.

From the various reports which you have heard read you will have gathered a fair idea of the work taken in hand by the Union, and also of the work which it may be expected to accomplish in the future. The excursions to Grantham and neighbourhood, to Bourn, and to Great Cotes were well attended, and the best thanks of all the members are due to Mr. and Mrs. Cordeaux for their kind hospitality on the last occasion. These excursions, however, though most enjoyable, are rather pleasant meetings than opportunities for obtaining great results. This, I take it, is as it should be. The object of a Union like ours is to interest as large a number of people as possible in natural history, geology, and kindred studies, and such an interest is far better promoted by friendly gatherings such as these, with a semi-scientific flavour about them, if we may use the term, than by insisting upon the Union being placed entirely upon a scientific basis. It is from the efforts of small bodies of specialists, or even of individuals, within the Union that real scientific results may be expected, and we certainly have excellent examples of these efforts in the geological excursions conducted by Mr. J. H. Cooke, which ought, however, to have been more largely attended; and in the formation of a Boulder Committee, with the Rev. W. Tuckwell as secretary; and, above all, in the formation of the nucleus of a County Museum.

The mention of the Museum brings me to what is, I feel sure, the most important part of my address. The great object which the Union ought to set before itself is the establishment of a Museum worthy of the traditions of the county. The present rooms, although hitherto they have excellently served their purpose, are fast becoming quite inadequate. There can be no doubt that there is a strong feeling in the county that such a Museum ought to be established, and we feel confident that its establishment is only a matter of time. Should not the Union, then, do all that it can to hasten it? It is a building that is chiefly required; as

regards the endowment, it is very probable that considerable help might be given by the Technical Education Committee of the County Council; and it surely ought not to be difficult to raise £2,000 or £3,000 from the whole county, when we consider the large sum that was raised in Lincoln alone for the School of Science and Art. Over and over again we hear of the irreplaceable treasures that leave the county, simply because there is no place to store them in for the public benefit, and if the Union does nothing more than help towards the providing of the much needed Museum, it will not have existed in vain. In this connection I should very much like to thank Mr. Fieldsend, in the name of the Union, for all he has done for our present collections.

On an occasion like the present it is usual for the President of a Union like ours not only to set forth the position and aims of the Union, and anything of interest in its history during the course of the past year, but also to say a few words on the particular subject in which he may himself have taken an interest.

Now, in considering the subject of this part of my address, I have felt very much at a loss, for it is, of course, right that it should, if possible, have some bearing upon the natural history, geology or archæology of Lincolnshire. I should hardly, however, venture to do more than merely touch upon the geology, botany, or ornithology of the county, in the presence of several leading authorities on these subjects; and with regard to the conchology and, more particularly, the entomology, I have made comparatively few observations, as the chief part of the time which I have felt I could legitimately devote to natural history has been spent on the general subjects of the British Coleoptera, and lately of the Central American Homoptera; such observations, moreover, as I have been able to make, have been mostly limited to the immediate neighbourhood of Lincoln. I feel convinced, however, that, in spite of the fact that many of the fen species have been doubtless effaced by drainage, the county will be found to be exceedingly rich in every branch of natural history, and it is to be hoped that, in the field of entomology, workers may be found who will emulate such ardent geologists as Mr. F. M. Burton and Mr. Cooke, such indefatigable botanists as Mr. Peacock and the Rev. W. Fowler, and such world-renowned ornithologists as Mr. Cordeaux.

If we consider the physical features of Lincolnshire we shall see that it ought certainly to contain a large and varied

insect fauna, for it may roughly be divided into three districts, which are quite distinct in general character; to begin with, there is the large coast line, bounded by great sand-dunes, on which the low thickets of the buckthorn (*Rhamnus catharticus*) and coarse reeds and grasses give shelter to numerous good insects of various orders; in passing, we may notice that these dunes in summer are the haunt of the rare Natterjack Toad (*Bufo calamita*), which has been found by members of the Union on summer excursions to Mablethorpe and the surrounding district; in the second place there are large expanses of what was formerly fen country but now is mostly drained; there are, however, many occasional ponds and marshy corners, which, we may be sure, afford a last shelter to many of the fen species, especially the water insects; and, thirdly, there are the higher districts, often well wooded, which present every indication of an abundance of invertebrate life; the woods towards the west are apparently outlying remnants of the ancient Forest of Sherwood, which besides containing many good lepidoptera, is the sole, or almost the sole, habitat of several of our rarest beetles; we might, perhaps, almost regard the banks of the Trent as a fourth district, for it has an insect fauna of its own; quite recently one of the least common species of British Carabidæ or ground-beetles, *Bembidium stomoides*, has been found in large numbers near Torksey Abbey by the Rev. A. Thornley, who has done a great deal of good work at the beetles of both Lincolnshire and Nottinghamshire.

If we look at a geological map of the county we shall find that the whole south-eastern portion, comprising nearly one-fourth of the county, is made up of drift or alluvial deposit; north of this, and running somewhat in a direction from N.W. to S.E. are two broad strips of Upper Oolite and chalk, separated by a narrow and irregular band of Lower Greensand; the western portion of the county is almost entirely taken up by three fairly regular strips consisting of Lias on the extreme west, then Lower Oolite and next Middle Oolite; it would be an interesting point to work out the distribution of the insect fauna of these divisions; in great measure, of course, it depends upon the flora, which undoubtedly varies with the geological formation, although Mr. Woodruffe-Peacock, who has made this subject peculiarly his own, says that the presence of humidity or dryness and the permeability or impermeability of the soil has more to do with the matter than chemistry.

At present the very local butterfly *Hesperia paniscus* (the Chequered Skipper) appears to be confined to the Middle Oolite district, its range extending from Bourn on the south to the woods around Wickenby and Market Rasen and, perhaps, further north. Most probably this is accidental, but I have no record of its occurence outside this narrow strip. The mention of the butterfly raises memories of many pleasant afternoons, when I have seen it flying up and down with its peculiarly glancing rapid flight in the glades of Newball Wood, near Wragby. I remember that when I first came to Lincoln I was introduced to its locality by Mr. Barber, of Lincoln (an excellent taxidermist and keen naturalist, who died quite young), and that there seemed to be a considerable probability of the butterfly being exterminated by dealers from Hull, who with the retail price fixed at 8d. or 9d., were able to make a very fair profit out of a good day's collecting. We were, therefore, very pleased when Mr. Wordsworth, the courteous agent of Earl Manvers, closed the woods entirely to all except a limited number of legitimate naturalists, to whom cards of admission are issued each year on application; it is a great pity that the privilege cannot be extended in many other cases, but, as a rule, where woods and parks are entirely closed, we shall find that too often the closure has been caused by abuse of privilege; either plants have been ruthlessly destroyed, or fences damaged, or gates left open, or game disturbed. A gamekeeper in Sherwood Forest once told me that a man had been going about with a butterfly-net and taking pheasant eggs all the time; what wonder then if the innocent suffer with the guilty. Were we the owners of property we should act in the same way in the face of wanton provocation. Even genuine collectors and observers are too often utterly careless. One of the best localities for beetles in the whole of the Midlands is entirely shut up now because someone who ought to have known better threw away a match after lighting his pipe and fired the whole place. This, of course, is a digression, and in any case it is well that there are a large number of localities which are practically inaccessible. If all the habitats of our birds, insects, and flowers were open to everyone, the rarer species would soon become extinct, for nothing apparently can exceed the greed of the collector for gain, a person who brings especial discredit upon the study of the lepidoptera, which are perhaps the most marketable of all natural history commodities. Of course, certain insects have become or are

becoming extinct for reasons over which there is no control —notably the drainage of the Fen district. The great instance, perhaps, is the Large Copper Butterfly, which has not been seen for about fifty years, although there are several now living who can remember the insect as quite common in Yaxley and neighbouring Fens. A friend of mine, now far advanced in years, once bought a boxful for a half-penny apiece, and now £7 is not an uncommon price for a good specimen. *Noctua subrosea* is another less known fen insect which has been extinguished by drainage, and *Orgyia cænosa* (the Reed Tussort) has comparatively recently disappeared; *Cleora viduaria* (the Speckled Beauty) has, I believe, not occurred for many years in the New Forest; *Lycæna acis* (the Mazarine Blue) is already gone; and the two conspicuous butterflies, *Aporia cratægi* (the Black-veined White) and *Lycæna arion* (the Large Blue) appear to be in imminent danger of complete extinction; in one or two of these cases the destruction of the food plant by the burning of pasture or grazing of sheep may be the cause of the disappearance, but in others the numbers have certainly been much diminished by collectors, and a Committee has recently been appointed by the Council of the Entomological Society to enquire into the matter generally, and, if possible, to devise a plan by which some of the rapidly disappearing species may be yet preserved.

This, perhaps, may seem to have but little bearing upon the natural history of the county, but I have not much doubt that some of those now extinct insects were once common in the Lincolnshire fens; in fact, through Mr. Barber, whom I have before mentioned, I thought I had secured some evidence of the occurrence of the Large Copper in the county within the last twenty-five or thirty years, but on examining into it, it did not appear sufficiently trustworthy to found a record on. The Swallow-tail Butterfly (*Papilio machaon*), the most conspicuous of all our British insects, ought certainly to occur in Lincolnshire, and I believe that it has been found, but I cannot come across any authentic record. This beautiful species will soon be exterminated from its chief haunt, Wicken Fen, but it will still linger in many inaccessible localities in the Norfolk Broads and smaller Cambridgeshire Fens, such as Chippenham, where the larvæ have been found feeding on *Angelica sylvestris*. With regard to Butterflies undoubtedly occurring in the county, we have already alluded to *Hesperia paniscus*, and *Thecla betulæ* (the Brown Hair-streak) and *Apatura iris* (the Purple

Emperor) are well worthy of record. A stray specimen of *Venessa antiopa* (the Camberwell Beauty) has occurred this summer at Bracebridge, Lincoln. *Melitæa artemis* (the Greasy Fritilliary) and *Melanagria galathea* (the Marbled White) are local but not uncommon. Of butterflies which occur abundantly in many other counties, *Gonepteryx rhamni* (the Brimstone) may be noticed as very rare, and of *Satyrus tithonus* (the Large Heath) only three specimens have, apparently, been taken. These were captured by the Rev. G. H. Raynor (from whom I received some most valuable notes) at Panton, near Wragby, very occasionally. The Clouded Yellow (*Colias edusa*) is abundant, as it is in other parts of England. Of Moths we cannot here give any detailed list; but the common occurrence of the Death's Head Moth caterpillar during 1895 and 1896 may be noticed. Unfortunately a considerable number have been spoilt by the country people, who regard them as venomous serpents, and will only pick them up, more or less roughly, with tongs or other implements, the injury caused being sufficient to produce a crippled imago. The Convolvulus Hawk Moth (*Sphinx convolvuli*), the Large and Small Elephant Hawk Moth (*Chærocampa elpenor* and *C. porcellus*), and the Broad and Narrow-bordered Bee Hawk *Macroglossa fuciformis* and *M. bombyliformis*) have been taken at Panton, and Newball and Legsby Woods; and among other things may be mentioned the Alder Moth (*Acronycta alni*), which used to be one of the rarest British moths, but is apparently not uncommon around Lincoln, and the Swallow Prominents (*Ptilodonta dictæa* and *P. dictæoides*), which have been found in the Lincoln and Market Rasen districts.

Amongst other orders of insects the Coleoptera, when really worked and properly catalogued, will be found to comprise a large number of good species. I could give a fair list of names, but will not burden this address with particulars that cannot be otherwise than uninteresting to any but enthusiastic beetle hunters. The county is evidently rich in Hymenoptera, and probably in Diptera.

For an agricultural county like Lincolnshire, however, the great interest of the Entomology lies in its economic considerations, such as the prevalence and spread of injurious insects, the effects on the crops, and possible remedies. For our increased knowledge of this subject we have much for which to thank Miss E. A. Ormerod, who has spared no pains or money to help combat these pests of the farmers, and I feel

sure that all persons interested in her work will deeply sympathise with her in the loss of her sister and energetic fellow worker.

As a rule the subject of Economic Entomology is much neglected by farmers, although a few well-timed precautions will often save a large amount of trouble and money: in nothing is the old proverb more true that a stitch in time saves nine. In Lincolnshire, where the consideration of the best way to deal with insect pests (especially those that attack cereals) ought to be of paramount importance, the subject has hardly been taken up by anyone except Mr. Ralph Lowe, of Sleaford, and Mr. Eardly Mason, of Alford, who some years ago made observations in certain cases of attack which were of great interest. We are far behind the people of the United States in this matter. There a State Entomologist is appointed, whose periodic reports, in their style, fulness, and excellent illustrations are models of what such reports should be. It is true that Miss Ormerod issues excellent yearly reports in her private capacity; but our official reports are, as a rule, meagre in the extreme, and our best entomologists have little or nothing to do with them. This is much to be deplored, for insect attack, more or less serious, is always present among us. Occasionally there is a scare; we can most of us recall the excitement caused by what people thought to be the threatened invasion of the Colorado Potato Beetle. Its importation alive was strictly prohibited, the walls both in town and country were placarded with illustrations and notices of precautions to be taken if it arrived, and of course every harmless beetle was supposed to be a Colorado Beetle. This was but natural, as people who had never thought of a beetle before began to look out for them, and of course found and made notes of various species. The authorities of one important town seriously sent up to London an ordinary large 7-spot ladybird, feeling confident that at last the dreaded plague had come and that they were the fortunate discoverers of its advent. Most of us, too, can remember the more recent scare concerning the Hessian Fly, how perpetual articles regarding it kept appearing in the papers, and how it was held up as the last straw that would break the farmer's back. But the fact is that the Hessian Fly is always among us: it is only on occasions (due to the climate of the season favouring its increase, or other causes which require careful investigation) that its attack becomes serious. There are, unfortunately, many other

enemies of the corn crops whose attacks are, under favourable circumstances, quite as much to be feared as that of the Hessian Fly. Among them we may mention the Frit Fly (*Oscinis frit*), the Gout Fly (*Chlorops tæniopus*), the Wheat Fly (*Hylemyia coarctata*), the Wheat Midge or "Red Maggot" (*Cecidomyia tritici*), an insect closely allied to the Hessian Fly (*Cecidomyia destructor*), the Saddle Fly (*Diplosis equestris*), first discovered as British by Mr. Mason, near Alford, the Corn Aphis (*Aphis* (*Siphonophara*) *granaria*), the Corn Sawfly (*Cephus pygmæus*), the Corn Thrips (*Thrips cerealium*), and last, but not least, the Wire-worms, which are not worms at all, but the larvæ of certain beetles, and the two species of "Eelworms" (*Tylenchus devastatrix* and *T. tritici*), which are true nematodes or threadworms, one attacking oats, rye and clover, and the other doing considerable damage at times to the wheat crops. This, it must be allowed, is a formidable list of pests, but fortunately, they never seem to attack at once, and even in the same localities their ravages are sporadic; one farm, for instance, may be ravaged by wire-worms in one year and little harmed in the next, while on an adjoining farm the case may be just reversed. Evidently, then, there are many problems to be solved—problems requiring careful examination by skilled specialists, but likely to repay a hundredfold the cost of their solution. It is for this reason that we would ask for the appointment of a State Entomologist for Great Britain, whose duty it shall be to inspect any infected district, to report on any cases of disastrous infestation of which he has obtained knowledge, and to take such precautionary measures as he may deem requisite. May I give one instance of the extreme value of the researches of the American State Entomologist, Professor Riley, whose recent sad death by a fall from his bicycle is so much deplored by entomologists throughout the world. Some years ago the orange orchards of one of the orange-growing states were in danger of imminent destruction by a species of "mealy-bug" (*Icerya*); ruin stared the proprietors in the face until Professor Riley, who was investigating the infestation, found that a like species of "mealy bug" was found in New Zealand, but did no appreciable harm there. On examining into matters he found that the pest was extensively preyed upon and so kept down by a small species of beetle belonging to the Lady-Bird tribe (*Vedalia cardinalis*), which closely resembles in size and colour our ordinary small red Lady-Bird.

He therefore imported numbers of these insects to the infested American districts, and on being placed on the orange trees they grew and multiplied until they practically exterminated the "mealy bug" within a comparatively short space of time; in fact, it is said that a certain amount of the insect had to be cultivated, if we may so call it, in order to keep up the supply of the *Vedalia*.

I had at first intended to give some account of certain of the insect pests before referred to, but I find that I have already trespassed too much upon your time. As you have been kind enough to re-elect me as President for the year 1897, I may perhaps be allowed, if all be well, to continue the subject in my next presidential address.

I would conclude by again returning to the subject of the Museum, and expressing a strong hope that it may not be long before we obtain, through individual or collective generosity, a suitable building, and in that case I feel sure that we shall soon get together a collection of objects of interest which will be fully worthy of this large and important county of Lincolnshire.

THE LINCOLN GAP.

THE Rev. S. Bateman in his paper, in the last number of *Lincolnshire Notes & Queries*, on my address on the "Lincoln Gap," gives certain reasons for supposing that the change in the Trent's course took place after, and not before, the Glacial era; but I fail to see how the reasons he gives affect the question.

Some of the changes Mr. Bateman speaks of are of, comparatively, quite recent origin; while the change in the Trent's course must have occurred thousands of years ago.

Mere changes of bed are of common occurrence in the history of the Trent. Indeed, whenever you meet with a river with a wide, flat basal-area, like that of the Trent, you may safely assume that it is continually shifting its bed—the broad, flat area being, in fact, the result of such shifting.

In places also where rivers form two or more channels, as they often do, all but one of such channels are sometimes cut off

by banking; and this might easily have been the case with the Trent in some of the localities noticed by Mr. Bateman—as at Dunham and elsewhere—while, in other places, the course of a river is often changed by the cutting off of wandering loops, in order to increase the land area; or for other useful purposes.

The escarpments which Mr. Bateman alludes to, and which are records of very considerable antiquity, occur in various places on the Trent sides; but they are merely the result of the harder rocks resisting the wear and tear of the water and atmosphere, and they have no special bearing either on ice-action itself, or the relative time of its occurrence.

The only proofs that can be accepted as to when the great change in the Trent's course occurred, in relation to the Glacial era, must be sought for in the usual remains left by the ice, such as boulder deposits, foreign erratics, and so forth; and, as these proofs are at present wanting in the area in question, until they are met with, it will be impossible to say, with any authority, when the change occurred.

I quite agree, as I say in my address, that the Trent has from time to time frequently gone over its old course through the Lincoln Gap, especially in seasons of flood; and, probably, it did not relinquish that course for a very long period after it was tapped by the drainage through the *longitudinal* valley on the north, heading back from, and leading into, the Humber.

There is no reason to doubt that the great ice-plough, in some form or other, ran up the Trent valley; but, owing to the action of the river, and the force of the tide—which, at one time, extended higher up, and spread further over, the adjoining land than it does now—all traces of this event appear to have been swept away; and the only remains of water action are—so far, at all events, as I am myself aware of—rounded pebbles and gravel, such as occur in the old course through the Lincoln Gap, which the river has brought down from the area it drains on the west; and which have been by the force of stream and tide assorted, and re-assorted, over and over again, till the problem has become a very difficult one to decipher.

I quite admit the possibility of the Glacial period having preceded, instead of having occurred after, the change in the Trent's course, but at present it is an open question; and until the proofs, which ice-action alone can give, are obtained, it must, I fear, remain so.

F. M. Burton.

NATURAL HISTORY NOTES.

WHAT TO NOTE AND HOW TO MAKE NOTES.*

By GREGORY O. BENONI.

NO man knows how much the world has lost by some of her greatest sons not having the gift or knack—for it is very often only the latter—of jotting down their experiences and observations in black and white. When we consider the time we all waste in trifling, a few moments occupied daily in writing would never be missed. But what should we have in return? The experiences of the man of action, the stories of the talker, the bon-mots of the convivial and versatile companion at our last field meeting, who was the soul and life of the whole affair, and the notes of the observant naturalist, whose opportunity of seeing what is best worth recording is infinitely greater than any the late Richard Jefferies ever had, if his power of clothing his memories in living language may never be comparable with that "nature poet's" wonderful gift.

Scores of keen-minded men see things almost daily which are worthy of permanent record—the field-mouse in the hedge stealing hip and haw, when in a prolonged frost the snow wraps the ground with that thick white mantle so destructive to animal and bird life—or the young oak thrusting up from the little creature's abandoned home and store after a mild winter as the observer stalks his rabbits down the wood side. But few, how few, realise the truly valuable facts amongst the crowd of things they see, or take the trouble, if they know how, to make a note of them. We mean to make notes that will be of value in refreshing the memory at any time, or for future publication.

What to note is the difficulty of all young naturalists. Mere bare lists in any department of natural history, without any annotations, are of comparatively little value; at most they only appeal to workers at geographical distribution. The fact of such species being found in a given spot is recorded, but the nexus which gives the sparkling touch of life to the thing

* Reprinted by special permission from *The Naturalist*, July, 1897.

recorded is wanting. For instance, the young botanist in Lincolnshire, who knows his plants fairly well, is adding hardly anything to our knowledge of nature by bare lists of species which grow in his neighbourhood. But let him take the new drift maps, published by the Geological Survey, in his hand as he walks, and accurately note the changing flora with the varying outcrops and soils he passes over, and he will just give us that connecting link which makes his work live. If the elevation, humidity, porosity, and impenetrability of the surface has nothing to do with the distribution, he has discovered the chemistry of the soil has, and a quantitative and qualitative analysis of the plants will show it. He has pointed out to the chemist where his work has to begin and what the problem is he must settle. Had as much been known as might be discovered with a little trouble on this very question of geological distribution, thousands of acres would not have been sown down to permanent pasture with expensive seeds, which the land could not support till the passage of years had accumulated its fertility. When a young lady drew a lovely picture of the heath-covered wolds of Lincolnshire the other day in a magazine article she had just missed the nexus, which was all important to the truth, if not the loveliness, of her description. Our wolds are chalk, but our English heaths cannot stand a particle of lime in their love for silica. Our wind-blown sand-hills and commons are clothed with their fair pink bells, and so to a perfervid but inaccurate mind the chalk hills must be, but nature having ordained it otherwise—it is not so. The point to catch and note for ever is the nexus or connecting link between the thing observed or the action seen and its environment. Nothing is there by accident, nothing is done in nature without a motive, an all-sufficient reason. When we observed all the birds flying in one direction on Salisbury plain, as if a bush fire were behind them, we did not doubt there was a very good reason, and found it later in the "dew pond" at the foot of Sidbury Hill. The only open water for miles on that barrow-strown height, was frequented by all the birds and animals round. But the fox and rat, rabbit and hare, did not visit the spot at the same time of day, nor the different species of birds drink together, but we made no notes, and missed the nexus, and are ignorant why to this moment. The water was full of newts and lower life forms, and if we remember accurately a solitary species of *Potamogeton*, but that was not surprising, as these ponds are sometimes frequented by wild fowl.

But the point to notice is that what we did not find out we missed for good, first, because we did not picture before our minds the connecting link and work till it was discovered; and secondly, *we did not make any accurate notes* at the time for future study. The droppings of birds were on the low firm railings which kept the horses and cattle from the water, while the sheep could pass under and drink their fill; but we idly tapped them into the water, regardless of the undigested seeds they contained, as we watched the newts and kept a pair of wood pigeons from their evening drink or bath. We never made a note of what was growing round the pond to see if it differed from the surrounding herbage, though we noted how frequently the birds left droppings after drinking. The stupidity of these lost opportunities, how vexed they make a naturalist in his future work! Sidbury Hill stands on or just beyond the family property of the late Sir John Astley, of sporting fame, and this suggests an incident of observation which only required an accurate note to have made it of value. Late one day Sir John shot a wood pigeon at Elsham, in Lincolnshire, with such a distended crop that he could not help noticing it. Opening it, he found it not only remarkably full, but was also struck by the number of the species of seeds. These were sown in a flower-pot of the largest size and placed in the forcing-house. A full and varied crop of the weeds of our stubbles was the reward of his care, but no botanist was called in to name the species and work out their numerical relation, and so the value of the experiment was lost for want of an accurate note.

Note-making is the simplest thing in the world, far simpler than finding material worthy of permanent record, as every hard-working field naturalist knows to his cost. What days and weeks have we all spent fruitlessly on the look-out for something new, when it was only our own stupidity which prevented us seeing what was just under our noses! Though we knew water plants have a wider distribution than land plants, we had to visit a deep unfrozen spring twenty times in the great frost of 1895 before the bright green foliage struck our mind's eye, and it flashed into our vacant organ that the deep warm springs in the north, and by contrast the deep cool springs of the south, could keep an uniform temperature in a limited area and preserve a flora and its attendant life, which would become a centre of distribution should the climate change to greater warmth or cold. We must brighten and

polish up our faculties in the field if we would find plenty of material worthy of our note-books. An unknown quantity of unobserved connections lie around us the moment we leave our doors; if we do not find them some one else will.

How to make notes is our next point. If you have not invented a plan—a good one, mind you, of your own—try this one; it is perhaps the simplest and most effective yet discovered. We all have our favourite books, even when we get better; Bell's *Quadrupeds*, 2nd ed., and Yarrell's *Birds*, 4th ed., are ours. Now, for example, you want to make a note of the long-tailed field mouse. Take a half sheet of ordinary note paper and write the number of Bell's page 293 in the left-hand corner, then the English or Latin name, or both if you like, opposite. Underline these names, and in the right-hand corner add the figure 1 to signify this is the first page devoted to this species. Then make your notes, carefully recording place, date, and fact, or anything you consider important to notice. In this printed sketch the underlined parts are reproduced in *italics*.

293. *Mus sylvaticus* L. *Long-tailed Field Mouse.* 1

Bottesford, Lincs., 7.11.69. Dug out nest. There was a side-bolt. Had stored acorns, nuts, and wheat.

Cadney, Lincs., 24.9.93. Watched one carrying wheat to its nest.

Harrington, Northamps., 8.7.89. Young oak springing up from deserted winter store in field by Larkland Wood.

If we are dealing with our bird-notes we work just the same.

3

320. *Scolopax rusticola* L. *Woodcock.* 2

Broughton Wood, Lincs., 1872. Very plentiful this year, I hear.

The same. 1876. First seen 18.10.76.

Harrington, Northamps. Big fall in 1870, Mr. Cheney told me, after rough N.E. winds.

Cadney, Lincs, 1894. Watched one under hedge of oak wood through field-glass turning over the dead leaves and eating worms.

The left-hand figures refer to Yarrell, volume 3, page 320. When the notes accumulate, a little case of deal, 12in. long, 8in wide, and 3in. deep, stained throughout but varnished only on the outside, keeps them neatly together, in the order

of the left-hand numbers; while at the same time they may be turned over like the leaves of a book to find the sheet required, after the general index of Bell and Yarrell has been first consulted to give the right number. If a page gets damaged by mistakes or an accident it can easily be re-copied without spoiling the look of the whole series of notes, as is too often the case if a book is used. It is also much easier to write on sheets than in a book. A more simple way than using any author's order and the index to his book is to keep the notes in alphabetical order. There is only one danger in doing this. The nomenclature of species is so uncertain and various in different authors, that cross-references have to be added for all the commoner scientific names. If this is not done with great care by young naturalists, notes on the same species will be scattered under different scientific names throughout his whole collection. But the alphabetical order has one great advantage; notes on every department can be kept together in one long series. When the sheets may be reckoned by thousands, as in our own case, it becomes the only practical way.

A friend of the cynical order, who knows his own foibles as well as he sees other men's, suggested that note paper is a handy size for illustrations, and pointed out how they enrich any collection of notes. He enclosed one as a specimen of what these should be like—a sketch of a bird shot with an ounce of water instead of lead. He maintained he had never heard of water-shooting till we told him how to proceed. Whether in his hands it has been successful in saving damage to the plumage of delicate birds we cannot say, as his cartoon is the last communication we have had on the subject.

In another paper we purpose to make a selection from the notes of a North Lincolnshire naturalist to illustrate how interesting these casual jottings, which only take a few minutes to carefully observe and record, become as facts accumulate in the passage of years.

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The Executive Committee consists of all Members who serve in, or have at any time served in, the offices of President, or Secretary of the Union, or its sections. This Committee has the sole management of all affairs of the Union, subject to the approval of the Committee of the whole Union, to which it reports fully at the annual Lincoln meeting.

Ladies and Gentlemen desirous of becoming Members of the Union should apply to the Organising Secretary for nomination papers. A new member requires to be proposed and seconded, and the paper must be countersigned by the President or one of the Vice-Presidents of the Union.

Correspondence with respect to Field and Sectional Meetings and organisation generally should be addressed to Rev. E. Adrian Woodruffe-Peacock, Cadney Vicarage, Brigg.

It is hoped that all members will interest themselves in the work of the Union. Proposal Forms will be sent to each member applying for them.

FIELD MEETINGS, 1896.

The Field Meetings arranged for Season 1896 are the following :—

Grantham, Nat. Hist. Div. 15, in June, with a drive to Ancaster, under the guidance of Mr. Henry Preston, F.G.S.

Bourne, Nat. Hist. Div. 16 can be thoroughly worked, in July.

Great Cotes, Nat. Hist. Div. 4, in September, when Mr. John Cordeaux, M.B.O.U., leads and entertains the Union.

General Meeting, with President's Address, Thursday, October 29th.

A Lincolnshire Museum.

Hon. Curator and Taxidermist :—ALFRED FIELDSEND, 2, Norman Street, Lincoln.

Museum Committee:

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With power to add to their number Members of the Union or gentlemen interested in the history, antiquities, and educational questions of the county.

The County Committee have lent the L.N.U. the use of a suite of rooms, free of rent, in the Castle Gateway as a temporary Museum. Mr. A. Fieldsend has kindly consented to act as Honorary Curator and Taxidermist, and all specimens may be sent to him.

F. M. BURTON, F.G.S. J. H. COOKE, F.G.S.

REV. E. A. WOODRUFFE-PEACOCK, F.G.S. H. PRESTON, F.G.S.

REV. A. W. ROWE, F.G.S. REV. W. TUCKWELL, *Secretary.*

With power to add to their number ; for the purpose of investigating and recording the erratics and boulders of the County.

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Grantham, Nat. Hist. Div. 15, in June, with a drive to Ancaster, under the guidance of Mr. Henry Preston, F.G.S.

Bourne, Nat. Hist. Div. 16 can be thoroughly worked, in July.

Great Cotes, Nat. Hist. Div. 4, in September, when Mr. John Cordeaux, M.B.O.U., leads and entertains the Union.

General Meeting, with President's Address, Thursday, October 29th.

A Lincolnshire Museum.

Hon. Curator and Taxidermist :—ALFRED FIELDSEND, 2, Norman Street, Lincoln.

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